



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

EducT

118

49.437

≡duc T 118.49.437

Harvard College
Library



BOUGHT
FROM THE GIFT OF
CHARLES HERBERT THURBER



3 2044 096 994 306



0 A

KEY

TO THE

INTRODUCTION

TO THE

NATIONAL ARITHMETIC,

EXHIBITING THE OPERATION OF

THE MORE DIFFICULT EXAMPLES

IN THAT WORK;

FOR THE USE OF TEACHERS ONLY.

By BENJAMIN GREENLEAF, A. M.

PRINCIPAL OF BRADFORD TEACHERS' SEMINARY.

New Stereotype Edition.

BOSTON:

PUBLISHED BY ROBERT S. DAVIS,

NO. 120 WASHINGTON STREET.

~~~~~  
1849.



dec T 118.49. HARVARD COLLEGE LIBRARY  
 FROM THE GIFT OF  
 437 CHARLES HERBERT THORNER  
 Jul. 26, 1927

Entered according to Act of Congress, in the year 1844, by R. GREENLEAF, in the Clerk's Office of the District Court of the District of Massachusetts.

# **GREENLEAF'S SERIES OF ARITHMETICS.**

1. **MENTAL ARITHMETIC**, upon the Inductive Plan, designed for Beginners. By Benjamin Greenleaf, A. M., Principal of Bradford (Mass.) Teachers' Seminary.

2. **INTRODUCTION TO THE NATIONAL ARITHMETIC**, designed for Common Schools. Fifteenth improved stereotype edition, revised and enlarged.

3. **THE NATIONAL ARITHMETIC**, for advanced Scholars in Common Schools and Academies. Twenty-fifth improved stereotype edition. 360 pages, full bound.

**COMPLETE KEYS TO THE INTRODUCTION AND NATIONAL ARITHMETICS**, containing Solutions and Explanations, for Teachers only. (In separate volumes.)

\*.\* The attention of Teachers and Superintendents of Schools generally is respectfully invited to this popular system of Arithmetic, which is well adapted to *all classes of students*. The whole or a part of this series has been recommended and adopted by the superintending school committees of the principal towns in New England, and is also used in the best public and private schools in various sections of the United States.

GREENLEAF'S NATIONAL ARITHMETIC is now extensively used as a text-book in many distinguished seminaries of learning, including the following:—The several STATE NORMAL SCHOOLS in Massachusetts, under the direction of the State Board of Education; the NORMAL SCHOOLS in New York city; Rutgers Female Institute, New York; Brooklyn (N. Y.) Female Academy; Abbott Female Academy, and Phillips Academy, Andover; Chauncey Hall School, Boston; Bradford Female Seminary; Phillips Academy, Exeter; Young Ladies' Institute, Pittsfield; Worcester County High School, Worcester; Williston Seminary, East Hampton, Mass.; together with the best schools in Boston, New York, Philadelphia, Richmond, Charleston, Savannah, Mobile, New Orleans, and other cities; and wherever the work has been introduced, *it is still used with great success*,—which is deemed a sufficient recommendation.

**Parker's Progressive Exercises in English Composition.**  
 New stereotype edition, revised, enlarged, and improved. 144 pages. Price, 34 cents.

**Class-Book of Prose and Poetry:**  
 consisting of Selections from the best English and American Authors; designed as Exercises in Parsing, for the use of Common Schools and Academies. By T. Rickard, A. M., and H. Orcutt, A. M. (Teachers). Price 12½ cents single, \$1 per dozen.

\*.\* A cheap work like the above (comprised in a small volume) has long been needed.

## **The Classical Reader:**

A Selection of Lessons in Prose and Verse, from the most esteemed English and American Writers. Intended for the Use of the Higher Classes in Public and Private Seminaries. By F. W. P. Greenwood, D. D., and George B. Emerson, A. M., of Boston. Tenth edition, stereotyped. With an engraved frontispiece.

## **Smith's Class-Book of Anatomy:**

Explanatory of the First Principles of Human Organization as the Basis of Physical Education; with numerous Illustrations, a full Glossary, or Explanation of Technical Terms, and Practical Questions at the Bottom of the Page. Designed for Schools and Families. Tenth stereotype edition, revised and enlarged.

## **A Grammar of the Greek Language.**

By Benjamin Franklin Fisk, A. M. Twenty-ninth improved stereotype edition.  
 \*.\* Fisk's Greek Grammar is used in Harvard University, and in many other distinguished collegiate and academic institutions in various parts of the United States.

## **Fisk's Greek Exercises. [New Edition.]**

Greek Exercises: containing the Substance of the Greek Syntax, illustrated by Passages from the best Greek Authors, to be written out from the Words given in their simplest Form. By Benjamin Franklin Fisk, A. M. "Consuetudo et exercitatio facilitatem maxime parit."—*Quintil.* Adapted to the Author's "Greek Grammar."

## **Leverett's Cæsar's Commentaries.**

Cali Julii Cæsaris Commentarii de Bello Gallico ad Codices Parisinos recensiti, a N. L. Achaintre and N. E. Lemaire. Accesserunt Notulæ Anglicæ, atque Index Historicus et Geographicus. Curavit F. P. Leverett, A. M.

## **Folsom's Cicero's Orations.**

M. T. Ciceronis Orationes Quædam Selectæ, Notis Illustratæ. [By Charles Folsom, A. M.] In Usu Academiæ Exoniensis. Editio stereotype, Tabulis Analyticis instructa.

[These editions of Cæsar and Cicero are highly recommended by Prof. John J. Owen.]

Published by ROBERT S. DAVIS, 120 Washington Street, BOSTON, and sold by all the principal Booksellers throughout the country.

☞ Also constantly for sale (in addition to his own publications), a complete assortment of School-books and Stationery, which are offered to Booksellers, School Committees, and Teachers on very liberal terms.

## P R E F A C E .

---

THE object of the author, in this publication, is to aid the teacher in communicating instruction to his pupils, and in detecting any error, which they may have made in the operation of the examples.

Every instructor, who has a large number of scholars under his care, is aware, that it is a great tax on his time, especially when in school, to examine the operation of many arithmetical questions ; whereas, by the aid of a Key, he may readily detect any mistake in the operation. Besides, amid the labors of the school-room, it is often very difficult for the most able arithmetician to recollect, at the moment, all the principles involved in the solution of difficult questions ; but, by recurring to a Key, this difficulty will be obviated.

The author would recommend to teachers, never to point out *directly* to the pupil the method of solving a problem, nor perform the labor for him, but suggest and explain such principles, as will enable him to perform the question himself.

The answers to all the examples in the Arithmetic are inserted in the Key, for the convenience of those teachers, who may prefer to use the edition of the Arithmetic, which does not contain the answers.

B. GREENLEAF.

*Bradford*, March 28, 1849.

# CONTENTS.

|                                                                                     | PAGE     |
|-------------------------------------------------------------------------------------|----------|
| Notation and Numeration (Articles 3-16) . . . . .                                   | 5        |
| Addition (Art. 21-24) . . . . .                                                     | 6        |
| Subtraction (Art. 32) . . . . .                                                     | 7        |
| Multiplication (Art. 36-44) . . . . .                                               | 7-8      |
| Division (Art. 50-58) . . . . .                                                     | 8-10     |
| Contractions in Multiplication (Art. 59-62) . . . . .                               | 10       |
| Contractions in Division (Art. 63-65) . . . . .                                     | 10       |
| Miscellaneous Examples . . . . .                                                    | 10, 11   |
| United States Money (Art. 70-79) . . . . .                                          | 11-14    |
| Reduction (Art. 86-100) . . . . .                                                   | 14-27    |
| Addition of Compound Numbers (Art. 101) . . . . .                                   | 27       |
| Subtraction of Compound Numbers (Art. 102, 103) . . . . .                           | 27, 28   |
| Miscellaneous Exercises in Addition and Subtraction of Compound Numbers . . . . .   | 28-30    |
| Multiplication of Compound Numbers (Art. 106, 107) . . . . .                        | 30-32    |
| Division of Compound Numbers (Art. 110, 111) . . . . .                              | 32-34    |
| Miscellaneous Examples in Multiplication and Division of Compound Numbers . . . . . | 35-37    |
| Cancellation (Art. 115-117) . . . . .                                               | 37       |
| Properties and Relations of Numbers (Art. 122-128) . . . . .                        | 38       |
| Vulgar Fractions (Art. 135-172) . . . . .                                           | 38-68    |
| Decimal Fractions (Art. 181-189) . . . . .                                          | 69-74    |
| Reduction of Currencies (Art. 191-194) . . . . .                                    | 74-75    |
| Simple Interest (Art. 197-201) . . . . .                                            | 75-81    |
| Partial Payments (Art. 203, 204) . . . . .                                          | 82-86    |
| Problems in Interest (Art. 207-209) . . . . .                                       | 86       |
| Compound Interest (Art. 211, 212) . . . . .                                         | 87       |
| Discount (Art. 216) . . . . .                                                       | 88       |
| Bank Discount (Art. 218, 219) . . . . .                                             | 88, 89   |
| Commission and Brokerage (Art. 221, 222) . . . . .                                  | 89, 90   |
| Stocks (Art. 224) . . . . .                                                         | 90       |
| Insurance (Art. 226) . . . . .                                                      | 91       |
| Duties (Art. 228, 229) . . . . .                                                    | 91, 92   |
| Assessment of Taxes (Art. 231, 232) . . . . .                                       | 92, 93   |
| Equation of Payments (Art. 234, 235) . . . . .                                      | 93-95    |
| Simple Proportion (Art. 248) . . . . .                                              | 95-98    |
| Compound Proportion (Art. 250) . . . . .                                            | 98-101   |
| Partnership, or Company Business (Art. 252, 253) . . . . .                          | 101-106  |
| Profit and Loss (Art. 255-258) . . . . .                                            | 106-108  |
| Miscellaneous Exercises . . . . .                                                   | 108, 109 |
| Duodecimals (Art. 260-262) . . . . .                                                | 109-111  |
| Involution (Art. 264, 265) . . . . .                                                | 112      |
| Extraction of the Square Root (Art. 268, 269) . . . . .                             | 112-115  |
| Application of the Square Root (Art. 270-280) . . . . .                             | 115-117  |
| Extraction of the Cube Root (282-288) . . . . .                                     | 117-123  |
| Arithmetical Progression (290-296) . . . . .                                        | 123, 124 |
| Geometrical Progression (Art. 298-301) . . . . .                                    | 124, 125 |
| Alligation (Art. 304-308) . . . . .                                                 | 126, 127 |
| Permutation (Art. 310) . . . . .                                                    | 127      |
| Mensuration of Surfaces (Art. 314-332) . . . . .                                    | 127, 128 |
| Mensuration of Solids (Art. 335-353) . . . . .                                      | 128-130  |
| Mensuration of Lumber and Timber (Art. 355-357) . . . . .                           | 130, 131 |
| Miscellaneous Examples . . . . .                                                    | 131-141  |

# K E Y

TO

## GREENLEAF'S INTRODUCTION.

---

### NOTATION AND NUMERATION.

#### ROMAN NOTATION.

|                    |          |    |              |
|--------------------|----------|----|--------------|
| 2. (ART. 3, p. 8.) | LXXXVII. | 6. | DXLII.       |
| 3.                 | CX.      | 7. | MCCCXIX.     |
| 4.                 | CLXIX.   | 8. | MDCCCXLVIII. |
| 5.                 | CCLXXV.  |    |              |

#### FRENCH NOTATION AND NUMERATION.

|                      |            |     |                |
|----------------------|------------|-----|----------------|
| 1. (ART. 13, p. 13.) | 47         | 10. | 408,096        |
| 2.                   | 359        | 11. | 5,402          |
| 3.                   | 6,575      | 12. | 907,805,074    |
| 4.                   | 908        | 13. | 347,915        |
| 5.                   | 19,000     | 14. | 89,047         |
| 6.                   | 1,504      | 15. | 51,081         |
| 7.                   | 27,000,500 | 16. | 7,395          |
| 8.                   | 99,099     | 17. | 57,059,099,047 |
| 9.                   | 42,002,005 |     |                |

#### ENGLISH NOTATION AND NUMERATION.

|                      |                                       |
|----------------------|---------------------------------------|
| 1. (ART. 16, p. 15.) | 325,412                               |
| 2.                   | 214,165 ; 078,056                     |
| 3.                   | 42 ; 617,031 ; 041,342                |
| 4.                   | 2,008 ; 009,082 ; 701,908             |
| 5.                   | 168,247 ; 324,341 ; 472,319 ; 816,421 |

## ADDITION.

|                       |          |     |               |
|-----------------------|----------|-----|---------------|
| 3. (ART. 21, p. 21.)  | 978      | 7.  | 698           |
| 4.                    | 889      | 8.  | 999           |
| 5.                    | 998      | 9.  | 439           |
| 6.                    | 669      | 10. | 868           |
| 10. (ART. 24, p. 23.) | 3555     | 38. | 76833457      |
| 11.                   | 3212     | 39. | 1111110       |
| 12.                   | 1922     | 40. | 9323          |
| 13.                   | 3175     | 41. | 7693486       |
| 14.                   | 27891    | 42. | 3155917       |
| 15.                   | 289436   | 43. | 2643          |
| 16.                   | 354409   | 44. | 1039          |
| 17.                   | 347514   | 45. | 227934        |
| 18.                   | 382898   | 46. | 63315         |
| 19.                   | 26027511 | 47. | 2373544       |
| 20.                   | 1366855  | 48. | 8272 dollars. |
| 21.                   | 6908906  | 49. | 131 trees.    |
| 22.                   | 142885   | 50. | 1563 pounds.  |
| 23.                   | 21616    | 51. | 2103 dollars. |
| 24.                   | 766503   | 52. | 2257 dollars. |
| 25.                   | 13814    | 53. | 500 dollars.  |
| 26.                   | 969754   | 54. | 9115 dollars. |
| 27.                   | 11720    | 55. | 2234822       |
| 28.                   | 31622    | 56. | 5073577       |
| 29.                   | 949661   | 57. | 4597824       |
| 30.                   | 86578    | 58. | 4984097       |
| 31.                   | 539658   | 59. | 172246        |
| 32.                   | 57372    | 60. | 95947         |
| 33.                   | 848340   | 61. | 102201        |
| 34.                   | 1000779  | 62. | 100536        |
| 35.                   | 694764   | 63. | 113378        |
| 36.                   | 156800   | 64. | 86621         |
| 37.                   | 1802790  |     |               |

## SUBTRACTION.

|                      |               |     |                     |
|----------------------|---------------|-----|---------------------|
| 8. (ART. 32, p. 32.) | 47896         | 27. | 89901               |
| 9.                   | 265899        | 28. | 90909091            |
| 10.                  | 587544        | 29. | 999991              |
| 11.                  | 377778        | 30. | 2967                |
| 12.                  | 9393239896470 | 31. | 99995000            |
| 13.                  | 1             | 32. | 767 dollars.        |
| 14.                  | 471112        | 33. | 39 years.           |
| 15.                  | 981012        | 34. | 105 years.          |
| 16.                  | 1             | 35. | 366                 |
| 17.                  | 9998392       | 36. | 219327 inhabitants. |
| 18.                  | 6097700810072 | 37. | 85423333 pounds.    |
| 19.                  | 7977100909213 | 38. | 1176249 bushels.    |
| 20.                  | 7100061569937 | 39. | 3528 dollars.       |
| 21.                  | 500710920089  | 40. | 18 dollars.         |
| 22.                  | 1             | 41. | 7965037 dollars.    |
| 23.                  | 455555556     | 42. | 577904              |
| 24.                  | 8753086431    | 43. | 2588 acres.         |
| 25.                  | 799690466     | 44. | 49841021 miles.     |
| 26.                  | 24974975      |     |                     |

## MULTIPLICATION.

|                      |                  |     |                 |
|----------------------|------------------|-----|-----------------|
| 9. (ART. 36, p. 38.) | 6910677          | 14. | 50246229        |
| 10.                  | 7012310120       | 15. | 60725 dollars.  |
| 11.                  | 53580296         | 16. | 228456 dollars. |
| 12.                  | 24881935         | 17. | 27918 letters.  |
| 13.                  | 105185376        |     |                 |
| (ART. 40, p. 41.)    |                  | 12. | 10989 dollars.  |
| 8.                   | 611 dollars.     | 13. | 13505 miles.    |
| 9.                   | 2813 dollars.    | 14. | 8760 hours.     |
| 10.                  | 35599 dollars.   | 15. | 5481 gallons.   |
| 11.                  | 1853654 dollars. | 16. | 200451 dollars. |

|     |                          |     |                 |
|-----|--------------------------|-----|-----------------|
| 17. | 68816 pounds.            | 26. | 532088          |
| 18. | 321300                   | 27. | 3831635         |
| 19. | 518077                   | 28. | 1462126         |
| 20. | 881919                   | 29. | 264640056       |
| 21. | 9691836                  | 30. | 99070437        |
| 22. | 18219071                 | 31. | 826888542       |
| 23. | 70287492                 | 32. | 290355807       |
| 24. | 153288487686             | 33. | 721361144       |
| 25. | 49062139937803           | 34. | 3798979491      |
| 2.  | (ART. 42, p. 43.) 765325 | 6.  | 2851200 inches. |
| 3.  | 123396                   | 7.  | 631152 hours.   |
| 4.  | 611226                   | 8.  | 68520 feet.     |
| 5.  | 987625                   |     |                 |
| 2.  | (ART. 43, p. 44.) 23560  | 4.  | 7964000         |
| 3.  | 587300                   | 5.  | 9872500000      |
|     | (ART. 44, p. 45.)        | 9.  | 69660900000000  |
| 4.  | 72103581726300           | 10. | 9100899999000   |
| 5.  | 490154012100000000       | 11. | 24010024010000  |
| 6.  | 28522743249000           | 12. | 400400800400400 |
| 7.  | 4179911100000            | 13. | 1224241200000   |
| 8.  | 11717175236000           | 14. | 14122412100     |

## DIVISION.

| (ART. 50, p. 50.) |            |      | Quotients. Rem. |               |
|-------------------|------------|------|-----------------|---------------|
|                   | Quotients. | Rem. | 14.             | 54848 5       |
| 5.                | 757913     | 0    | 15.             | 186529 6      |
| 6.                | 1460898    | 1    | 16.             | 958131 11     |
| 7.                | 141090     | 5    | 17.             | 1135791 1     |
| 8.                | 47316      | 4    | 18.             | 162255 6      |
| 9.                | 994864     | 8    | 19.             | 202818 6      |
| 10.               | 698082     | 1    | 20.             | 225353 3      |
| 11.               | 528776     | 9    | 21.             | 187794 2      |
| 12.               | 79992      | 4    | 22.             | 170721 9      |
| 13.               | 55096      | 6    | 23.             | 78715 dollars |

|     |                 |     |               |
|-----|-----------------|-----|---------------|
| 24. | 17167 acres.    | 28. | 99483 yards.  |
| 25. | 876451 dollars. | 29. | 109517 acres. |
| 26. | 14888 dollars.  | 30. | 371 dollars.  |
| 27. | 9589 bushels.   | 31. | 1315          |

|                      | Quotients. | Rem. |    | Quotients. | Rem. |
|----------------------|------------|------|----|------------|------|
| 2. (ART. 51, p. 52.) | 216        | 0    | 4. | 13717421   | 0    |
| 3.                   | 89786      | 10   | 5. | 32534467   | 5    |

|                       |          |     |     |                   |           |
|-----------------------|----------|-----|-----|-------------------|-----------|
| 10. (ART. 54, p. 54.) | 234      |     | 27. | 5502              | 95        |
| 11.                   | 365      |     | 28. | 9755              | 4060      |
| 12.                   | 145      | 6   | 29. | 3453              | 7122      |
| 13.                   | 7634     | 0   | 30. | 30003             | 0         |
| 14.                   | 5204     | 11  | 31. | 26750             | 962       |
| 15.                   | 290720   | 25  | 32. | 86268755          | 480       |
| 16.                   | 68549    | 88  | 33. | 8428688           | 22346     |
| 17.                   | 240415   | 5   | 34. | 62927             | 2295060   |
| 18.                   | 15608    | 5   | 35. | 1099              | 200210510 |
| 19.                   | 129725   | 66  | 36. | 476 dollars.      |           |
| 20.                   | 144927   | 36  | 37. | 395 acres.        |           |
| 21.                   | 14703    | 55  | 38. | 763 dollars.      |           |
| 22.                   | 1919     | 55  | 39. | 345 bushels each. |           |
| 23.                   | 912      | 30  | 40. | 389 dollars.      |           |
| 24.                   | 3502319  | 714 | 41. | 1234 men.         |           |
| 25.                   | 26080418 | 234 | 42. | 65384477 dollars. |           |
| 26.                   | 11058232 | 277 |     |                   |           |

|                      |       |    |      |
|----------------------|-------|----|------|
| 2. (ART. 55, p. 56.) | 30613 | 5. | 7901 |
| 3.                   | 1469  | 6. | 182  |
| 4.                   | 7546  | 7. | 264  |

|                      |    |    |     |
|----------------------|----|----|-----|
| 3. (ART. 56, p. 57.) | 54 | 5. | 77  |
| 4.                   | 20 | 6. | 405 |

|                      | Quotients. | Rem. |    | Quotients. | Rem.     |
|----------------------|------------|------|----|------------|----------|
| 2. (ART. 57, p. 58.) | 689        | 2    | 4. | 24         | 815      |
| 3.                   | 43         | 75   | 5. | 9876       | 54321123 |



| (ART. 58, p. 59.) |            |      | Quotients. |            | Rem.        |
|-------------------|------------|------|------------|------------|-------------|
|                   | Quotients. | Rem. | 5.         | 1473       | 2597        |
| 2.                | 44         | 74   | 6.         | 102        | 497654325   |
| 3.                | 332        | 192  | 7.         | 3491706185 | 306787      |
| 4.                | 667        | 253  | 8.         | 85         | 44916000000 |

## CONTRACTIONS IN MULTIPLICATION.

|                   |             |    |              |
|-------------------|-------------|----|--------------|
| (ART. 59, p. 60.) |             | 3. | 14197467925  |
| 2.                | 1914741450  | 4. | 3086419725   |
| (ART. 60, p. 60.) |             | 3. | 29037739400  |
| 2.                | 11892984700 | 4. | 19454930400  |
| (ART. 61, p. 60.) |             | 3. | 154320875    |
| 2.                | 995665625   | 4. | 381232750    |
| (ART. 62, p. 61.) |             | 3. | 876542123457 |
| 2.                | 1233332433  | 4. | 999998000001 |

## CONTRACTIONS IN DIVISION.

|                      |                           |    |                         |
|----------------------|---------------------------|----|-------------------------|
| 2. (ART. 63, p. 61.) | 395061                    | 4. | 35999 $\frac{88}{100}$  |
| 3.                   | 55157                     |    |                         |
| (ART. 64, p. 62.)    |                           | 4. | 143686 $\frac{8}{100}$  |
| 2.                   | 29629629 $\frac{63}{100}$ | 5. | 2690 $\frac{28}{100}$   |
| 3.                   | 261371 $\frac{34}{100}$   | 6. | 535 $\frac{62}{100}$    |
| 2. (ART. 65, p. 62.) | 13825                     | 5. | 3917 $\frac{184}{1000}$ |
| 3.                   | 3830106                   | 6. | 6689 $\frac{177}{1000}$ |
| 4.                   | 4729879                   |    |                         |

---

## MISCELLANEOUS EXAMPLES.

|             |                |    |              |
|-------------|----------------|----|--------------|
| 1. (p. 63.) | 584 dollars.   | 4. | 1530 cents.  |
| 2.          | 25088 dollars. | 5. | 873 dollars. |
| 3.          | 940 cents.     | 6. | 4257 cents.  |

|     |                   |     |                            |
|-----|-------------------|-----|----------------------------|
| 7.  | 2106 miles.       | 27. | 25                         |
| 8.  | 61 miles.         | 28. | 135442                     |
| 9.  | 35405 dollars.    | 29. | 144 feet.                  |
| 10. | 42884 dollars.    | 30. | 123040 rods.               |
| 11. | 7665 dollars.     | 31. | 630 dollars.               |
| 12. | 37 dollars.       | 32. | 187 dollars.               |
| 13. | 47 dollars.       | 33. | 1188 dollars.              |
| 14. | 1368 hours.       | 34. | 413 dollars.               |
| 15. | 5904 ounces.      | 35. | 5430 dollars.              |
| 16. | 56960 acres.      | 36. | 457 dollars.               |
| 17. | 234 dollars.      | 37. | Loss, 3 dollars.           |
| 18. | 3178 dollars.     | 38. | Gain, 22 dollars.          |
| 19. | 7581 dollars.     | 39. | The land, by 5136 dollars. |
| 20. | Gain, 1488 cents. | 40. | 543 dollars.               |
| 21. | 576 dollars.      | 41. | 635 dollars.               |
| 22. | 20 dollars.       | 42. | 743 dollars.               |
| 23. | 255 dollars.      | 43. | 1828 dollars.              |
| 24. | 3520              | 44. | 133 dollars.               |
| 25. | 1607              | 45. | 27 dollars.                |
| 26. | 5666              | 46. | 533 dollars.               |

## UNITED STATES MONEY.

|                   |               |    |              |
|-------------------|---------------|----|--------------|
| (ART. 70, p. 69.) |               | 5. | \$ 41.23     |
| 1.                | 12500 cents.  | 6. | 15629 cents. |
| 2.                | 345000 mills. | 7. | 16428 mills. |
| 3.                | 29,7 cents.   | 8. | 9870 mills.  |
| 4.                | \$ 2.68,2     |    |              |

## ADDITION.

|                   |              |     |            |
|-------------------|--------------|-----|------------|
| (ART. 71, p. 70.) |              | 10. | \$ 13.87,0 |
| 5.                | \$ 4408.88,8 | 11. | \$ 31.64,0 |
| 6.                | \$ 410.46,9  | 12. | \$ 21.62,0 |
| 7.                | \$ 448.36,8  | 13. | \$ 3.42,5  |
| 8.                | \$ 4713.78,6 | 14. | \$ 15.00,0 |
| 9.                | \$ 31.61,0   | 15. | \$ 48.32,0 |

## KEY TO

## SUBTRACTION.

|                      |             |     |            |
|----------------------|-------------|-----|------------|
| 5. (ART. 72, p. 71.) | \$ 52.66,4  | 10. | \$ 82.83,0 |
| 6.                   | \$ 71.97,6  | 11. | \$ 26.58,0 |
| 7.                   | \$ 724.89,8 | 12. | \$ 9.99,1  |
| 8.                   | \$ 782.20,6 | 13. | \$ 14.74,0 |
| 9.                   | \$ 65.98,0  | 14. | \$ 34.67,1 |

## MULTIPLICATION.

|                   |              |     |             |
|-------------------|--------------|-----|-------------|
| (ART. 73, p. 72.) |              | 8.  | \$ 85.50    |
| 3.                | \$ 44.55,0   | 9.  | \$ 672.01   |
| 4.                | \$ 414.64,0  | 10. | \$ 106.97   |
| 5.                | \$ 7.31,0    | 11. | \$ 450.00   |
| 6.                | \$ 30.87,5   | 12. | \$ 1600.50  |
| 7.                | \$ 1774.25,0 | 13. | \$ 24327.96 |

## DIVISION.

|                      |           |     |           |
|----------------------|-----------|-----|-----------|
| 3. (ART. 74, p. 73.) | \$ 137.37 | 9.  | \$ 0.93   |
| 4.                   | \$ 5.63   | 10. | \$ 3.28   |
| 5.                   | \$ 20.00  | 11. | \$ 11.67  |
| 6.                   | \$ 0.59   | 12. | \$ 4.68   |
| 7.                   | \$ 5.68   | 13. | \$ 132.55 |
| 8.                   | \$ 0.13   | 14. | \$ 5.75   |

## PRACTICAL QUESTIONS BY ANALYSIS.

|                      |           |    |            |
|----------------------|-----------|----|------------|
| 2. (ART. 76, p. 74.) | \$ 90.21  | 6. | \$ 68.40   |
| 3.                   | \$ 29.70  | 7. | \$ 5525.28 |
| 4.                   | \$ 42.21  | 8. | \$ 737.64  |
| 5.                   | \$ 728.19 |    |            |

10. (ART. 77, p. 75.)  $\$ 422.50 \div 65 = \$ 6.50$ ;  $\$ 6.50 \times 15 = \$ 97.50$  Ans.

11.  $\$ 2025 \div 45 = \$ 45$ ;  $\$ 45 \times 180 = \$ 8100$  Ans.

12.  $\$ 3.45 \div 5 = \$ 0.69$ ;  $\$ 0.69 \times 11 = \$ 7.59$  Ans.

13.  $\$ 214.50 \div 11 = \$ 19.50$ ;  $\$ 19.50 \times 87 = \$ 1696.50$  Ans.

14.  $\$ 60.00 \div 8 = \$ 7.50$ ;  $\$ 7.50 \times 87 = \$ 652.50$  Ans.

15.  $\$ 5.58 \div 9 = \$ 0.62$ ;  $\$ 0.62 \times 43 = \$ 26.66$  Ans.

16.  $\$ 85 \div 5 = \$ 17$ ;  $\$ 17 \times 97 = \$ 1649$  Ans.

17.  $\$3.80 \div 20 = \$0.19$ ;  $\$0.19 \times 59 = \$11.21$  Ans.  
 18.  $\$472.50 \div 27 = \$17.50$ ;  $\$17.50 \times 12 = \$210$  Ans.  
 19.  $\$39.69 \div 7 = \$5.67$ ;  $\$5.67 \times 57 = \$323.19$  Ans.  
 20.  $\$10.08 \div 144 = \$0.07$ ;  $\$0.07 \times 359 = \$25.13$  Ans.  
 21.  $\$77.13 \div 857 = \$0.09$ ;  $\$0.09 \times 359 = \$32.31$  Ans.  
 22.  $\$187.53 \div 987 = \$0.19$ ;  $\$0.19 \times 329 = \$62.51$  Ans.  
 23.  $\$26.32 \div 47 = \$0.56$ ;  $\$0.56 \times 39 = \$21.84$  Ans.
25. (ART. 78, p. 76.)  $\$175 \div \$5 = 35$  reams, Ans.  
 26.  $\$217.50 \div \$7.50 = 29$  barrels, Ans.  
 27.  $\$4875 \div \$75 = 65$  tons, Ans.  
 28.  $\$1728 \div \$4 = 432$  yards, Ans.  
 29.  $\$9.66 \div \$0.69 = 14$  hundred weight, Ans.  
 30.  $\$66.51 \div \$7.39 = 9$  barrels, Ans.  
 31.  $\$136.50 \div \$3.25 = 42$  cords, Ans.

BILLS.

(ART. 79, p. 77.)

| (1.) J. Smith.               | (2.) L. Webster.             |
|------------------------------|------------------------------|
| $\$0.75 \times 82 = \$61.50$ | $\$0.18 \times 6 = \$1.08$   |
| $0.92 \times 89 = 81.88$     | $0.20 \times 12 = 2.40$      |
| $0.50 \times 24 = 12.00$     | $1.80 \times 6 = 10.80$      |
| <hr/>                        | $0.26 \times 30 = 7.80$      |
| $\$155.38$                   | <hr/>                        |
|                              | $\$22.08$                    |
| (3.) J. Kimball.             | (4.) W. Greenleaf.           |
| $\$0.63 \times 14 = \$8.82$  | $\$0.50 \times 86 = \$43.00$ |
| $0.88 \times 12 = 10.56$     | $0.86 \times 90 = 77.40$     |
| $0.62 \times 23 = 14.26$     | $11.00 \times 18 = 198.00$   |
| $1.27 \times 16 = 20.32$     | $3.50 \times 23 = 80.50$     |
| $2.25 \times 17 = 38.25$     | $0.62 \times 14 = 8.68$      |
| <hr/>                        | $12.12 \times 12 = 145.44$   |
| $\$92.21$                    | $12.00 \times 46 = 552.00$   |
|                              | <hr/>                        |
|                              | $\$1105.02$                  |

(5.) A. Dow.

$$\$ 23.75 \times 37 = \$ 878.75$$

$$17.50 \times 42 = 735.00$$

$$99.00 \times 43 = 4257.00$$

$$175.00 \times 12 = 2100.00$$

$$7.00 \times 19 = 133.00$$

$$1.52 \times 23 = 34.96$$

---


$$\$ 8138.71$$

(6.) N. Webster.

$$\$ 1.20 \times 80 = \$ 96.00$$

$$3.00 \times 17 = 51.00$$

$$1.08 \times 19 = 20.52$$

$$0.75 \times 23 = 17.25$$

---


$$\$ 184.77$$

(7.) S. Osgood.

$$\$ 0.20 \times 27 = \$ 5.40$$

$$3.90 \times 10 = 39.00$$

$$4.75 \times 7 = 33.25$$

$$2.93 \times 19 = 55.67$$

$$0.37 \times 20 = 7.40$$

---


$$\$ 140.72$$

## REDUCTION.

(ART. 86, p. 86.)

(3.)

$$9\text{£. } 18\text{s. } 7\text{d.}$$

$$\underline{20}$$

$$198\text{s.}$$

$$\underline{12}$$

$$2383\text{d. Ans.}$$

(4.)

$$12)2383\text{d.}$$

$$20)198\text{s. } 7\text{d.}$$

$$\text{Ans. } 9\text{£. } 18\text{s. } 7\text{d.}$$

(5.)

$$14\text{£. } 11\text{s. } 5\text{d. } 2\text{qr.}$$

$$\underline{20}$$

$$291\text{s.}$$

$$\underline{12}$$

$$3497\text{d.}$$

$$\underline{4}$$

$$13990\text{qr. Ans.}$$

(6.)

$$4)13990\text{qr.}$$

$$12)3497\text{d. } 2\text{qr.}$$

$$20)291\text{s. } 5\text{d.}$$

$$\text{Ans. } 14\text{£. } 11\text{s. } 5\text{d. } 2\text{qr.}$$

(ART. 87, p. 88.)

|                                                                             |                                                                            |                                                                                                    |
|-----------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| (3.)<br>76dwt. 12gr.<br><u>24</u><br>306<br><u>153</u><br>Ans. 1836gr.      | (4.)<br>24)1836gr.<br>Ans. 76dwt. 12gr.                                    | (5.)<br>76lb. 5oz.<br><u>12</u><br>917oz.<br><u>20</u><br>18340dwt.<br><u>24</u><br>Ans. 440160gr. |
| (6.)<br>24)440160gr.<br>20)18340dwt.<br><u>12</u> 917oz.<br>Ans. 76lb. 5oz. | (7.)<br>144lb. 9oz.<br><u>12</u><br>1737oz.<br><u>20</u><br>Ans. 34740dwt. | (8.)<br>20)34740dwt.<br><u>12</u> 1737oz.<br>Ans. 144lb. 9oz.                                      |

|                                                                                                    |                                                                                                            |                                                                                                             |
|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| (9.)<br>24)17895gr.<br>20)745dwt. 15gr.<br><u>12</u> 37oz. 5dwt.<br>Ans. 3lb. 1oz.<br>[5dwt. 15gr. | (10.)<br>3lb. 1oz. 5dwt. 15gr.<br><u>12</u><br>37oz.<br><u>20</u><br>745dwt.<br><u>24</u><br>Ans. 17895gr. | (11.)<br>2oz. 18dwt. 12gr.<br><u>20</u><br>58dwt.<br><u>24</u><br>1404gr.<br><u>1.37</u><br>Ans. \$ 1923.48 |
|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|

(ART. 88, p. 89.)

|                                                                                   |                                                            |                                                                                                                |                                                                               |
|-----------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| (3.)<br>76lb<br><u>12</u><br>912½<br><u>8</u><br>72963<br><u>3</u><br>21888½ Ans. | (4.)<br>3)21888½<br>8)72963<br><u>12</u> 912½<br>Ans. 76lb | (5.)<br>144lb<br><u>12</u><br>1728½<br><u>8</u><br>138243<br><u>3</u><br>41472½<br><u>20</u><br>Ans. 829440gr. | (6.)<br>20)829440gr.<br>3)41472½<br>8)138243<br><u>12</u> 1728½<br>Ans. 144lb |
|-----------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|

| (7.)                | (8.)                     | (9.)     |
|---------------------|--------------------------|----------|
| 12lb 83 33 19 18gr. | 20)73178gr.              | 73 63 29 |
| <u>12</u>           | <u>3)36589 18gr.</u>     | <u>8</u> |
| 1523                | 8)12193 19               | 623      |
| <u>8</u>            | <u>12)1523 33</u>        | <u>3</u> |
| 12193               | Ans. 188 doses.          |          |
| <u>3</u>            | Ans. 12lb 83 33 19 18gr. |          |
| 36589               |                          |          |
| <u>20</u>           |                          |          |
| 73178gr. Ans.       |                          |          |

(ART. 89, p. 90.)

| (3.)                              | (4.)                                   |
|-----------------------------------|----------------------------------------|
| 16T. 19cwt. 0qr. 10lb. 11oz. 5dr. | 16)9722549dr.                          |
| <u>20</u>                         | 16)607659oz. 5dr.                      |
| 339cwt.                           | 28)37978lb. 11oz.                      |
| <u>4</u>                          | 4)1356qr. 10lb.                        |
| 1356qr.                           | 20)339cwt. 0qr.                        |
| <u>28</u>                         | Ans. 16T. 19cwt. 0qr. 10lb. 11oz. 5dr. |
| 37978lb.                          |                                        |
| <u>16</u>                         |                                        |
| 607659oz.                         |                                        |
| <u>16</u>                         |                                        |
| 9722549dr. Ans.                   |                                        |

| (5.)          | (6.)             | (7.)              | (8.)        |
|---------------|------------------|-------------------|-------------|
| 679cwt.       | 28)76048lb.      | 17cwt. 3qr. 18lb. | 48T. 17cwt. |
| <u>4</u>      | <u>4)2716qr.</u> | <u>4</u>          | <u>20</u>   |
| 2716qr.       | Ans. 679cwt.     | 71qr.             | 977cwt.     |
| <u>28</u>     |                  | <u>28</u>         | <u>4</u>    |
| 76048lb. Ans. |                  | 2006lb.           | 3908qr.     |
|               |                  | <u>.07</u>        | <u>28</u>   |
|               | Ans. \$ 140.42   |                   | 109424lb.   |
|               |                  |                   | <u>.08</u>  |
|               |                  | Ans. \$ 8753.92   |             |

(ART. 90, p. 92.)

$$\begin{array}{r} (3.) \\ 144\text{yd. 3qr.} \\ \underline{4} \\ \text{Ans. 579qr.} \end{array}$$

$$\begin{array}{r} (4.) \\ 4)579\text{qr.} \\ \text{Ans. 144yd. 3qr.} \end{array}$$

$$\begin{array}{r} (5.) \\ 17\text{ E. E. 4qr. 3na.} \\ \underline{5} \\ 89\text{qr.} \\ \underline{4} \\ \text{Ans. 359na.} \end{array}$$

$$\begin{array}{r} (6.) \\ 4)359\text{na.} \\ 5)89\text{qr. 3na.} \\ \text{Ans. 17 E. E. 4qr. 3na.} \end{array}$$

$$\begin{array}{r} (7.) \\ 126\text{yd. 0qr. 3na.} \\ \underline{4} \\ 504\text{qr.} \\ \underline{4} \end{array}$$

$$\begin{array}{r} (8.) \\ 4)2019\text{na.} \\ 4)504\text{qr. 3na.} \\ \text{Ans. 126yd. 0qr. 3na.} \end{array}$$

Ans. 2019na.

$$\begin{array}{r} (9.) \\ 49\text{yd. 3qr.} \\ \underline{4} \\ 199\text{qr.} \\ 2.17 \\ \text{Ans. \$ 431.83} \end{array}$$

$$\begin{array}{r} (10.) \\ 144\text{yd. 1qr. 3na.} \\ \underline{4} \\ 577\text{qr.} \\ \underline{4} \\ 2311\text{na.} \\ .25 \end{array}$$

Ans. \$ 577.75

(ART. 91, p. 93.)

$$\begin{array}{r} (3.) \\ 47\text{m.} \\ \underline{8} \\ 376\text{fur.} \\ 40 \\ 15040\text{rd.} \\ 16\frac{1}{2} \\ \text{Ans. 248160ft.} \end{array}$$

$$\begin{array}{r} (4.) \\ 16\frac{1}{2})248160\text{ft.} \\ 40)15040\text{rd.} \\ 8)376\text{fur.} \\ \text{Ans. 47m.} \end{array}$$



(5.)

78deg. 50m. 7fur. 30rd. 5yd. 2ft. 10in.

69½

5471m.

8

43775fur.

40

1751030rd.

5½

9630670yd.

3

28892012ft.

12

346704154in. Ans.

(6.)

12)346704154in.

3)28892012ft. 10in.

5½)9630670yd. 2ft.

40)1751030rd. 5yd.

8)43775fur. 30rd.

69½)5471m. 7fur.

Ans. 78deg. 50m. 7fur. 30rd.

[5yd. 2ft. 10in.]

(ART. 92, p. 95.)

(3.)

80)4386cha.

Ans. 54m. 66cha.

(4.)

54m. 66cha.

80

Ans. 4386cha.

(5.)

75m. 49cha.

80

6049cha.

4

Ans. 24196 poles.

(6.)

4)24196 poles.

80)6049cha.

Ans. 75m. 49cha.

(7.)

7m. 4fur. 30rd.

8

60fur.

40

2430rd.

25

Ans. 60750li.

(8.)

25)60750li.

40)2430rd.

8)60fur. 30rd.

Ans. 7m. 4fur. 30rd.

(ART. 93, p. 97.)

(3.)

49A. 3R. 16p.

4

199R.

40

7976p.

272½

Ans. 2171466ft.

(4.)

272½)2171466ft.

40)7976p.

4)199R. 16p.

Ans. 49A. 3R. 16p.

|                    |                     |
|--------------------|---------------------|
| (5.)               | (6.)                |
| 365A. 3R. 17p.     | 3A. 1R. 30p.        |
| <u>4</u>           | <u>4</u>            |
| 1463R.             | 13R.                |
| <u>40</u>          | <u>40</u>           |
| 58537p.            | 550p.               |
| 1.75               | <u>272½</u>         |
| Ans. \$ 102,439.75 | 149737½ft.          |
|                    | <u>1.25</u>         |
|                    | Ans. \$ 187171.87,5 |

|              |                     |                 |            |
|--------------|---------------------|-----------------|------------|
| (7.)         | (8.)                | (9.)            |            |
| 12m.         | 18A. 0R. 16p.       | 48A. 3R. 14p.   |            |
| <u>12</u>    | <u>4</u>            | <u>4</u>        |            |
| 144 sq. m.   | 72R.                | 195R.           |            |
| <u>640</u>   | <u>40</u>           | <u>40</u>       | \$ 3.15    |
| Ans. 92160A. | 2896p.              | 7814p.          | 2.25       |
|              | <u>272½</u>         | <u>.90</u>      | <u>.90</u> |
|              | Ans. 788436 sq. ft. | Ans. \$ 7032.60 |            |

|                       |                      |                 |
|-----------------------|----------------------|-----------------|
| (ART. 94, p. 99.)     |                      |                 |
| (3.)                  | (4.)                 | (5.)            |
| 45C.                  | 1728)9953280 cu. in. | 15ft.           |
| <u>128</u>            | <u>128)5760ft.</u>   | <u>4</u>        |
| 5760ft.               | Ans. 45C.            | 60              |
| <u>1728</u>           |                      | <u>6½</u>       |
| 9953280 cu. in., Ans. |                      | 128)390 cu. ft. |
|                       |                      | Ans. 3C. 6ft.   |

|                    |                   |
|--------------------|-------------------|
| (6.)               | (7.)              |
| 4ft.               | 14                |
| <u>3½</u>          | <u>12</u>         |
| 13                 | 168               |
| <u>2</u>           | <u>8</u>          |
| 26 cu. ft.         | Ans. 1344 cu. ft. |
| <u>1728</u>        |                   |
| Ans. 44928 cu. in. |                   |

(ART. 95, p. 100.)

(3.)

197 tuns 3hhd. 60gal. 3qt. 1pt.

4

791hhd.

63

49893gal.

4

199575qt.

2

399151pt.

4

Ans. 1596604gi.

(4.)

4)1596604gi.

2)399151pt.

4)199575qt. 1pt.

63)49893gal. 3qt.

4)791hhd. 60gal.

Ans. 197 tuns 3hhd. 60gal.

[3qt. 1pt.]

(5.)

7

63

441gal.

4

1764qt.

2

3528pt.

.05

Ans. \$ 176.40

(6.)

18 tuns 1hhd. 47gal.

4

73hhd.

63

4646gal.

1.25

Ans. \$ 5807.50

(ART. 96, p. 102.)

(3.)

4 tuns 1hhd. 17gal. 0qt. 1pt.

4

17hhd.

54

935gal.

4

3740qt.

2

7481pt. Ans.

(4.)

2)7481pt.

4)3740qt. 1pt.

54)935gal.

4)17hhd. 17gal.

Ans. 4 tuns 1hhd. 17gal. 0qt. 1pt.

(5.)

7hhd. 18gal.

54

396gal.

4

1584qt.

.04

\$ 63.36 Ans.

(6.)

18

54

972gal.

.15

Ans. \$145.80

(ART. 97, p. 103.)

$$\begin{array}{r}
 (3.) \\
 97\text{ch. } 30\text{bu. } 2\text{pk.} \\
 \underline{36} \\
 3522\text{bu.} \\
 \underline{4} \\
 14090\text{pk.} \\
 \underline{8} \\
 112720\text{qt., Ans.}
 \end{array}$$

$$\begin{array}{r}
 (4.) \\
 8)112720\text{qt.} \\
 \underline{4)14090\text{pk.}} \\
 36)3522\text{bu. } 2\text{pk.} \\
 \text{Ans. } 97\text{ch. } 30\text{bu.} \\
 \quad [2\text{pk.} \\
 (5.) \\
 35\text{bu. } 0\text{pk. } 0\text{qt. } 1\text{pt.} \\
 \underline{4} \\
 140\text{pk.} \\
 \underline{8} \\
 1120\text{qt.} \\
 \underline{2} \\
 2241\text{pt., Ans.}
 \end{array}$$

$$\begin{array}{r}
 (6.) \\
 2)2241\text{pt.} \\
 8)1120\text{qt. } 1\text{pt.} \\
 \underline{4)140\text{pk.}} \\
 \text{Ans. } 35\text{bu. } 0\text{pk. } 0\text{qt. } 1\text{pt.}
 \end{array}$$

$$\begin{array}{r}
 (7.) \\
 18\text{qr. } 0\text{bu. } 3\text{pk. } 5\text{qt.} \\
 \underline{8} \\
 144\text{bu.} \\
 \underline{4} \\
 579\text{pk.} \\
 \underline{8} \\
 \text{Ans. } 4637\text{qt.} \\
 (8.) \\
 8)4637\text{qt.} \\
 \underline{4)579\text{pk. } 5\text{qt.}} \\
 8)144\text{bu. } 3\text{pk.} \\
 \text{Ans. } 18\text{qr. } 0\text{bu. } 3\text{pk.} \\
 \quad [5\text{qt.}
 \end{array}$$

$$\begin{array}{r}
 (9.) \\
 19\text{bu. } 3\text{pk. } 7\text{qt. } 1\text{pt.} \\
 \underline{4} \\
 79\text{pk.} \\
 \underline{8} \\
 639\text{qt.} \\
 \underline{2} \\
 \text{Ans. } 1279\text{pt.}
 \end{array}$$

$$\begin{array}{r}
 (10.) \\
 2)1279\text{pt.} \\
 8)639\text{qt. } 1\text{pt.} \\
 \underline{4)79\text{pk. } 7\text{qt.}} \\
 \text{Ans. } 19\text{bu. } 3\text{pk. } 7\text{qt. } 1\text{pt.}
 \end{array}$$

(ART. 98, p. 105.)

$$\begin{array}{r}
 (3.) \\
 296\text{da. } 18\text{h. } 32\text{m.} \\
 \underline{24} \\
 7122\text{h.} \\
 \underline{60} \\
 \text{Ans. } 427352\text{m.}
 \end{array}$$

$$\begin{array}{r}
 (4.) \\
 60)427352\text{m.} \\
 \underline{24)7122\text{h. } 32\text{m.}} \\
 \text{Ans. } 296\text{da. } 18\text{h. } 32\text{m.}
 \end{array}$$

(5.)

365da. 5h. 48m. 57sec.

24

8765h.

60

525948m.

60

31556937sec.

30 years.

946708110

22699722sec.

Ans. 969407832sec.

262da. 17h. 28m. 42sec.

24

6305h.

60

378328m.

60

22699722sec.

(6.)

365da. 5h. 48m. 57sec. 31556937)969407832(30 years.

24946708110

8765h.

60)22699722sec.

60

60)378328m. 42sec.

525948m.

24)6305h. 28m.

60262da. 17h.

31556937 seconds in a solar year.

Ans. 30y. 262da. 17h. 28m. 42sec.

(7.)

60)684592m.

(8.)

67w. 6da. 9h. 52m.

24)11409h. 52m.

7

7)475da. 9h.

475da.

Ans. 67w. 6da. 9h. 52m.

24

11409h.

60

(ART. 99, p. 106.)

Ans. 684592m.

(3.)

27S. 19° 51' 28"

30

829°

60

49791'

60

Ans. 2987488"

(4.)

60)2987488"

60)49791' 28"

30)829° 51'

Ans. 27S. 19° 51' 28"

## MISCELLANEOUS EXERCISES.

1. (p. 107.)  $\$ 345 \times 100 = 34500$ ;  $34500 \div 18 = 34518$ ;  
 $34518 \times 10 = 345180$  mills, Ans.
2.  $345180$  mills  $\div 10 = 34518$ ;  $34518 \div 100 = \$ 345.18$ , Ans.
3.  $46\text{ s.} \times 20 = 920\text{ s.}$ ;  $920\text{ s.} \div 18\text{ s.} = 938\text{ s.}$ ;  $938\text{ s.} \times 12$   
 $= 11256\text{ d.}$ ;  $11256\text{ d.} \div 5\text{ d.} = 11261\text{ d.}$ ;  $11261\text{ d.} \times 4$   
 $= 45044\text{ qr.}$  Ans.
4.  $45044\text{ qr.} \div 4 = 11261\text{ d.}$ ;  $11261\text{ d.} \div 12 = 938\text{ s.}$  5d.;  
 $938\text{ s.} \div 20 = 46\text{ s.}$  18s. 5d. Ans.
5.  $61\text{ lb.} \times 12 = 732\text{ oz.}$ ;  $732\text{ oz.} \times 20 = 14640\text{ dwt.}$ ;  $14640\text{ dwt.}$   
 $\div 17\text{ dwt.} = 14657\text{ dwt.}$ ;  $14657\text{ dwt.} \times 24 = 351768\text{ gr.}$ ;  
 $351768\text{ gr.} \div 17\text{ gr.} = 351785\text{ gr.}$  Ans.
6.  $351785\text{ gr.} \div 24 = 14657\text{ dwt.}$  17gr.;  $14657\text{ dwt.} \div 20 =$   
 $732\text{ oz.}$  17dwt.;  $732\text{ oz.} \div 12 = 61\text{ lb.}$  0oz. 17dwt. 17gr.  
 Ans.
7.  $27\text{ lb} \times 12 = 324\text{ s.}$ ;  $324\text{ s.} \div 3\text{ s.} = 327\text{ s.}$ ;  $327\text{ s.} \times 8 =$   
 $2616\text{ s.}$ ;  $2616\text{ s.} \div 13 = 2617\text{ s.}$ ;  $2617\text{ s.} \times 3 = 7851\text{ s.}$ ;  
 $7851\text{ s.} \div 1\text{ s.} = 7852\text{ s.}$  Ans.
8.  $7852\text{ s.} \div 3 = 2617\text{ s.}$  1s.;  $2617\text{ s.} \div 8 = 327\text{ s.}$  1s.;  $327\text{ s.}$   
 $\div 12 = 27\text{ lb}$  3s. 1s. 1s. Ans.
9.  $83\text{ T.} \times 20 = 1660\text{ cwt.}$ ;  $1660\text{ cwt.} \div 11\text{ cwt.} = 1671\text{ cwt.}$ ;  
 $1671\text{ cwt.} \times 4 = 6684\text{ qr.}$ ;  $6684\text{ qr.} \div 3\text{ qr.} = 6687\text{ qr.}$ ;  
 $6687\text{ qr.} \times 28 = 187236\text{ lb.}$ ;  $187236\text{ lb.} \div 18\text{ lb.} =$   
 $187254\text{ lb.}$ ;  $187254\text{ lb.} \times 16 = 2996064\text{ oz.}$  Ans.
10.  $2996064\text{ oz.} \div 16 = 187254\text{ lb.}$ ;  $187254\text{ lb.} \div 28 = 6687\text{ qr.}$   
 $18\text{ lb.}$ ;  $6687\text{ qr.} \div 4 = 1671\text{ cwt.}$  3qr.;  $1671\text{ cwt.} \div 20 =$   
 $83\text{ T.}$  11cwt. 3qr. 18lb. Ans.
11.  $97\text{ yd.} \times 4 = 388\text{ qr.}$ ;  $388\text{ qr.} \div 3\text{ qr.} = 391\text{ qr.}$ ;  $391\text{ qr.} \times$   
 $4 = 1564\text{ na.}$ ;  $1564\text{ na.} \div 3\text{ na.} = 1567\text{ na.}$  Ans.
12.  $1567\text{ na.} \div 4 = 391\text{ qr.}$  3na.;  $391\text{ qr.} \div 4 = 97\text{ yd.}$  3qr.  
 3na. Ans.
13.  $57\text{ E. E.} \times 5 = 285\text{ qr.}$ ;  $285\text{ qr.} \div 4 = 71\text{ yd.}$  1qr. Ans.
14.  $71\text{ yd.} \times 4 = 284\text{ qr.}$ ;  $284\text{ qr.} \div 1\text{ qr.} = 285\text{ qr.}$ ;  $285\text{ qr.} \div$   
 $5 = 57\text{ E. E.}$  Ans.

15.  $15\text{m.} \times 8 = 120\text{fur.}$ ;  $120\text{fur.} + 7\text{fur.} = 127\text{fur.}$ ;  $127\text{fur.} \times 40 = 5080\text{rd.}$ ;  $5080\text{rd.} + 18\text{rd.} = 5098\text{rd.}$ ;  $5098\text{rd.} \times 16\frac{1}{2} = 84117\text{ft.}$ ;  $84117\text{ft.} + 10\text{ft.} = 84127\text{ft.}$ ;  $84127\text{ft.} \times 12 = 1009524\text{in.}$ ;  $1009524\text{in.} + 6\text{in.} = 1009530\text{in.}$  Ans.
16.  $1009530\text{in.} \div 12 = 84127\text{ft.}$  6in.;  $84127\text{ft.} + 16\frac{1}{2} = 5098\text{rd.}$  10ft.;  $5098\text{rd.} \div 40 = 127\text{fur.}$  18rd.;  $127\text{fur.} \div 8 = 15\text{m.}$  7fur. 18rd. 10ft. 6in. Ans.
17.  $95,000,000\text{ miles} \times 8 = 760000000\text{ furlongs}$ ;  $760000000\text{ furlongs} \times 40 = 30400000000\text{ rods}$ ;  $30400000000\text{ rods} \times 16\frac{1}{2} = 501600000000\text{ feet}$ ;  $501600000000\text{ feet} \times 12 = 6,019,200,000,000\text{ inches}$ , Ans.
18.  $6,019,200,000,000\text{in.} \div 12 = 501600000000\text{ft.}$ ;  $501600000000\text{ft.} \div 16\frac{1}{2} = 30400000000\text{rd.}$ ;  $30400000000\text{rd.} \div 40 = 760000000\text{fur.}$ ;  $760000000\text{fur.} \div 8 = 95,000,000\text{ miles}$ , Ans.
19.  $48\text{deg.} \times 69\frac{1}{2} = 3336\text{m.}$ ;  $3336\text{m.} + 18\text{m.} = 3354\text{m.}$ ;  $3354\text{m.} \times 8 = 26832\text{fur.}$ ;  $26832\text{fur.} + 7\text{fur.} = 26839\text{fur.}$ ;  $26839\text{fur.} \times 40 = 1073560\text{rd.}$ ;  $1073560\text{rd.} + 18\text{rd.} = 1073578\text{rd.}$ ;  $1073578\text{rd.} \times 16\frac{1}{2} = 17714037\text{ft.}$  Ans.
20.  $17714037\text{ft.} \div 16\frac{1}{2} = 1073578\text{rd.}$ ;  $1073578\text{rd.} \div 40 = 26839\text{fur.}$  18rd.;  $26839\text{fur.} \div 8 = 3354\text{m.}$  7fur.;  $3354\text{m.} \div 69\frac{1}{2} = 48\text{deg.}$  18m. 7fur. 18rd. Ans.
21.  $7\text{A.} \times 4 = 28\text{R.}$ ;  $28\text{R.} + 3\text{R.} = 31\text{R.}$ ;  $31\text{R.} \times 40 = 1240\text{p.}$ ;  $1240\text{p.} + 16\text{p.} = 1256\text{p.}$ ;  $1256\text{p.} \times 272\frac{1}{4} = 341946\text{ft.}$ ;  $341946\text{ft.} + 218\text{ft.} = 342164\text{ft.}$  Ans.
22.  $342164\text{ft.} + 272\frac{1}{4} = 1256\text{p.}$  218ft.;  $1256\text{p.} + 40 = 31\text{R.}$  16p.;  $31\text{R.} \div 4 = 7\text{A.}$  3R. 16p. 218ft. Ans.
23.  $25\text{ S. M.} \times 640 = 16000\text{A.}$ ;  $16000\text{A.} \times 160 = 2560000\text{p.}$ ;  $2560000\text{p.} \times 272\frac{1}{4} = 696960000\text{ft.}$ ;  $696960000\text{ft.} \times 144 = 100362240000\text{in.}$  Ans.
24.  $100362240000\text{in.} \div 144 = 696960000\text{ft.}$ ;  $696960000\text{ft.} \div 272\frac{1}{4} = 2560000\text{p.}$ ;  $2560000\text{p.} \div 160 = 16000\text{A.}$ ;  $16000\text{A.} \div 640 = 25\text{ square miles}$ , Ans.
25.  $15\text{T.} \times 40 = 600\text{ft.}$ ;  $600\text{ft.} \times 1728 = 1036800\text{in.}$  Ans.
26.  $1036800\text{in.} \div 1728 = 600\text{ft.}$ ;  $600\text{ft.} \div 40 = 15\text{T.}$  Ans.

27. 5hhd.  $\times$  63 = 315gal. ; 315gal.  $+$  17gal. = 332gal. ;  
 332gal.  $\times$  4 = 1328qt. ; 1328qt.  $+$  3qt. = 1331qt. ;  
 1331qt.  $\times$  2 = 2662pt. ; 2662pt.  $\times$  4 = 10648 gills, Ans.
28. 10648gi.  $\div$  4 = 2662pt. ; 2662pt.  $\div$  2 = 1331qt. ; 1331qt.  
 $\div$  4 = 332gal. 3qt. ; 332gal.  $\div$  63 = 5hhd. 17gal. 3qt.  
 Ans.
29. 29hhd.  $\times$  54 = 1566gal. ; 1566gal.  $+$  30gal. = 1596gal. ;  
 1596gal.  $\times$  4 = 6384qt. ; 6384qt.  $+$  3qt. = 6387qt. Ans.
30. 6387qt.  $\div$  4 = 1596gal. 3qt. ; 1596gal.  $\div$  54 = 29hhd.  
 30gal. 3qt. Ans.
31. 15ch.  $\times$  36 = 540bu. ; 540bu.  $+$  16bu. = 556bu. ; 556bu.  
 $\times$  4 = 2224pk. ; 2224pk.  $+$  3pk. = 2227pk. ; 2227pk.  
 $\times$  8 = 17816qt. ; 17816qt.  $\times$  2 = 35632pt. Ans.
32. 35632pt.  $\div$  2 = 17816qt. ; 17816qt.  $\div$  8 = 2227pk. ;  
 2227pk.  $\div$  4 = 556bu. 3pk. ; 556bu.  $\div$  36 = 15ch. 16bu.  
 3pk. Ans.
33. 365da.  $\times$  24 = 8760h ; 8760h.  $+$  6h. = 8766h. ; 8766h.  $\times$   
 60 = 525960m. ; 525960m.  $\times$  60 = 31557600sec. Ans.
34. 31557600sec.  $\div$  60 = 525960m. ; 525960m.  $\div$  60 =  
 8766h. ; 8766h.  $\div$  24 = 365da. 6h. Ans.
35. 365da.  $\times$  24 = 8760h. ; 8760h.  $+$  6h. = 8766h. ; 8766h.  
 $\times$  1842 = 16146972h. Ans.
36. 16146972h.  $\div$  8766 = 1842 years, Ans.
37. 8S.  $\times$  30 = 240° ; 240°  $+$  14° = 254° ; 254°  $\times$  60 =  
 15240' ; 15240'  $+$  18' = 15258' ; 15258'  $\times$  60 = 915480'' ;  
 915480''  $+$  17'' = 915497'', Ans.
38. 915497''  $\div$  60 = 15258' 17'' ; 15258'  $\div$  60 = 254° 18' ;  
 254°  $\div$  30 = 8S. 14° 18' 17'', Ans.
39. 13  $\times$  144  $\times$  .02 $\frac{1}{2}$  = \$ 46.80, Ans.
40. 12  $\times$  20  $\times$  .20 = \$ 48.00, Ans.
41. 2hhd.  $\times$  63  $\times$  4 = 504qt. ; 504qt.  $\div$  3 = 168 bottles, Ans.
42. \$ 1480.00  $\div$  25 = \$ 59.20 ; \$ 59.20  $\div$  160 = \$ 0.37, cost  
 of 1p. ; 37A. 2R. 18p. = 6018p. ; \$ 0.37  $\times$  6018 =  
 \$ 2226.66, Ans.
43. 5cwt. 3qr. 18lb. = 662lb. ; 662lb.  $\times$  \$ 0.09 = \$ 59.58 ;



- $\$1.75 \times 25 = \$43.75$ ;  $\$59.58 - \$43.75 = \$15.83$ ,  
Ans.
44. 2lb. 7oz. = 31oz.;  $\$46.50 \div 31 = \$1.50$ , price per oz.;  
 $\$1.50 \times 12 = \$18.00$ , price per pound, Ans.
45. 3T. 1cwt. 18lb. = 6850lb.;  $6850\text{lb.} \times \$0.12 = \$822.00$ ;  
 $6850\text{lb.} \times \$0.09 = \$616.50$ ;  $\$822.00 - \$616.50 =$   
 $\$205.50$ , Ans.
46. 37m. 7fur. 29rd. = 12149rd.;  $12149\text{rd.} \times \$5.75 =$   
 $\$69856.75$ , Ans.
47. 15m. 6fur. 37rd. = 5077rd.;  $5077\text{rd.} \times \$17.29 =$   
 $\$87,781.33$ , Ans.
48. 40p. 200ft. = 11090ft.;  $11090\text{ft.} \times \$1.50 = \$16,635$ , Ans.
49. 18ft.  $\times$  15ft. = 270 sq. ft.;  $270\text{ sq. ft.} \div 9 = 30\text{yd.}$  Ans.
50. 47da.  $\times$  10 = 470h.;  $470\text{h.} + 7\text{h.} = 477\text{h.} = 28620\text{m.}$ ;  
 $28620 \times 120 = 3434400$  nails, Ans.
51. 80rd.  $\times$  50rd. = 4000 sq. rd.;  $4000\text{ sq. rd.} \div 160 = 25$   
acres, Ans.
52.  $18000000 \div 90 = 200000\text{m.} = 138\text{da. } 21\text{h. } 20\text{m.}$  Ans.
53.  $9 \times 15 \times 23 = 3105\text{yd.}$ ;  $3105 \times \$0.08 = \$248.40$ , Ans.
54.  $6\text{m.} \times 4\frac{1}{2}\text{m.} = 27\text{ sq. m.}$ ;  $27\text{ sq. m.} = 17280\text{A.}$ ;  $17280$   
 $\div 90 = 192$  lots, Ans.
55.  $196\text{d. } 49\text{m.} = 282289\text{m.}$ ;  $282289 \times 47 = 13267583$  times,  
Ans.
56.  $36\text{ft.} \times 16\text{ft.} = 576\text{ sq. ft.}$ ;  $576\text{ sq. ft.} \times 2 = 1152\text{ sq. ft.}$   
 $= 165888\text{in.}$ ;  $165888\text{in.} \div 27 = 6144$  shingles, Ans.
57.  $110\text{m.} = 6969600\text{in.}$ ;  $12\text{ft. } 6\text{in.} = 150\text{in.}$ ;  $6969600 \div 150$   
 $= 46464$  times, Ans.
58.  $25 \times 7 \times 5 \times 12 \times 15 \times 178 = 28035000$ ;  $28035000$   
 $\times \$4.84 = \$135689400$ , Ans.
59.  $18 \times 5\frac{1}{2} = 99\text{yd.}$ ;  $99\text{yd.} + 5\text{yd.} = 104\text{yd.}$ ;  $104\text{yd.} \times 3$   
 $= 312\text{ft.}$ ;  $312\text{ft.} + 2\text{ft.} = 314\text{ft.}$ ;  $314\text{ft.} \times 12 = 3768\text{in.}$ ;  
 $3768\text{in.} + 11\text{in.} = 3779\text{in.}$  Ans.
60.  $3779\text{in.} \div 12 = 314\text{ft. } 11\text{in.}$ ;  $314\text{ft.} + 3 = 104\text{yd. } 2\text{ft.}$ ;  
 $104\text{yd.} \div 5\frac{1}{2} = 18\text{rd. } 5\text{yd. } 2\text{ft. } 11\text{in.}$  Ans.
61. 5T. 17cwt. 3qr. 18lb. = 13206lb.;  $13206 \times \$0.03 =$   
 $\$396.18$ , Ans.

62.  $25\text{rd.} \times 16\text{rd.} = 400 \text{ sq. rd.} = 108900 \text{ sq. ft.}; 108900 \times$   
 $\$1.25 = \$136,125; \$136,125 - \$100,000 = \$36,125,$   
 Ans.

### ADDITION OF COMPOUND NUMBERS.

- |                            |                                |
|----------------------------|--------------------------------|
| (ART. 101, p. 111.)        | 9. 102T. 1cwt. 3qr. 9lb. 15oz. |
| 3. 120£. 5s. 9d. 3qr.      | 10dr.                          |
| 5. 191lb. 1oz. 19dw. 15gr. | 11. 189 E. E. 0qr. 1na. 1½in.  |
| 7. 234lb 13 23 10 12gr.    |                                |
- 
- |                                 |                   |
|---------------------------------|-------------------|
| 13. 74m. 3fur. 39rd. 2½yd.      | 2ft. 6in.         |
|                                 | ½yd. = 1ft. 6in.  |
| <hr/>                           |                   |
| 74m. 3fur. 39rd. 3yd.           | 1ft. 0in.         |
| 15. 179m. 0fur. 6cha. 3p. 18li. |                   |
| 17. 162A. 0R. 2p. 17½yd.        | 4ft. 83in.        |
|                                 | ½yd. = 2ft. 36in. |
| <hr/>                           |                   |
| 162A. 0R. 2p. 17yd.             | 6ft. 119in.       |
- 
- |                                    |                                 |
|------------------------------------|---------------------------------|
| 19. 213C. 110ft. 1455in.           | 25. 211ch. 19bu. 3pk. 1qt. 1pt. |
| 21. 193 tun 2hhd. 27gal. 2qt. 0pt. | 27. 256w. 4da. 3h. 39m. 19s.    |
| 23. 211 tun 0hhd. 53gal. 1qt. 1pt. | 29. 11S. 0° 30' 21".            |

### SUBTRACTION OF COMPOUND NUMBERS.

- |                           |                               |
|---------------------------|-------------------------------|
| (ART. 102, p. 115.)       | 9. 1T. 2cwt. 0qr. 27lb. 3oz.  |
| 3. 51£. 18s. 10d. 2qr.    | 14qr.                         |
| 5. 691lb. 9oz. 4dw. 22gr. | 11. 151 E. E. 4qr. 2na. 1½in. |
| 7. 63lb 11 13 10 19gr.    |                               |
- 
- |                                |                   |             |
|--------------------------------|-------------------|-------------|
| 13. 8deg. 59½m.                | 1fur. 39rd. 2½ft. | 10in.       |
|                                | ½m. = 4fur.       | ½ft. = 6in. |
| <hr/>                          |                   |             |
| 8deg. 59m.                     | 5fur. 39rd. 3ft.  | 2in.        |
| 15. 13m. 5fur. 3cha. 1p. 21li. |                   |             |
| 17. 41A. 1R. 38p. 18½yd.       | 8ft. 143in.       |             |
|                                | ½yd. = 2ft. 36in. |             |
| <hr/>                          |                   |             |
| 41A. 1R. 38p. 19yd.            | 2ft. 35in.        |             |

|                                           |                                                                |
|-------------------------------------------|----------------------------------------------------------------|
| 19. 371C. 126ft. 1683in.                  | 23. 59 tun 2hhd. 42gal. 2qt. 1pt.                              |
| 21. 61 tun 1hhd. 60gal. 1qt.<br>1pt. 2gi. | 25. 53ch. 31bu. 1pk. 5qt. 0pt.<br>27. 4w. 1da. 9h. 26m. 27sec. |

(ART. 103, p. 118.)

| (2.)          | (3.)          | (4.)           | (5.)           |
|---------------|---------------|----------------|----------------|
| y. mo. da.    | y. mo. da.    | y. mo. da.     | y. mo. da.     |
| 1847 0 6      | 1837 3 25     | 1848 1 23      | 1845 5 8       |
| 1843 2 21     | 1832 10 15    | 1767 6 11      | 1767 2 15      |
| <u>3 9 15</u> | <u>4 5 10</u> | <u>80 7 12</u> | <u>78 2 23</u> |

# MISCELLANEOUS EXERCISES IN ADDITION AND SUBTRACTION OF COMPOUND NUMBERS.

(PAGE 119.)

| (1.)             | (2.)                      | (3.)                 |
|------------------|---------------------------|----------------------|
| lb. oz. dwt. gr. | lb. $\frac{3}{4}$ 3 2 gr. | T. cwt. qr. lb. oz.  |
| 4 8 13 8         | 7 3 2 2 1                 | 17 11 3 11 12        |
| 5 11 19 23       | 2 10 0 1 13               | 11 17 1 19 11        |
| 8 0 17 15        | 2 3 7 2 17                | 53 19 1 17 8         |
| 18 9 14 10       | <u>12 5 3 0 11</u>        | 27 19 3 18 9         |
| <u>37 7 5 8</u>  |                           | 16 3 3 0 13          |
|                  |                           | <u>127 12 1 12 5</u> |

| (4.)            | (5.)             | (6.)                      |
|-----------------|------------------|---------------------------|
| £. s. d.        | lb. oz. dwt. gr. | lb. $\frac{3}{4}$ 3 2 gr. |
| 7671 0 0        | 73 0 0 0         | 71 8 1 1 14               |
| 1728 17 9       | 26 11 13 14      | <u>7 9 1 1 17</u>         |
| <u>5942 2 3</u> | <u>46 0 6 10</u> | <u>63 10 7 2 17</u>       |

| (7.)                | (8.)          | (9.)             |
|---------------------|---------------|------------------|
| T. cwt. qr. lb. oz. | yd. qr. na.   | T. cwt. qr. lb.  |
| 28 13 0 0 0         | 37 3 3        | 2 13 1 17        |
| 10 17 0 19 14       | 18 1 3        | 3 0 0 27         |
| 17 15 3 8 2         | 31 1 2        | <u>1 0 3 11</u>  |
|                     | <u>87 3 0</u> | <u>6 14 1 27</u> |

(10.)

| m.    | fur. | rd. | ft. | in. |
|-------|------|-----|-----|-----|
| 16    | 7    | 18  | 14  | 11  |
| 19    | 1    | 13  | 16  | 9   |
| 97    | 3    | 27  | 13  | 3   |
| 47    | 5    | 37  | 13  | 10  |
| <hr/> |      |     |     |     |
| 181   | 2    | 18  | 8½  | 9   |
| <hr/> |      |     |     |     |
|       |      |     |     | ½=6 |

181 2 18 9 3

NOTE. As 8½ feet and 9 inches are equal to 8 feet and 15 inches, so we find 8 feet 15 inches equal to 9 feet 3 inches.

(11.)

| yd.   | qr. | na. |
|-------|-----|-----|
| 76    | 0   | 0   |
| 18    | 3   | 2   |
| <hr/> |     |     |
| 57    | 0   | 2   |

(12.)

| m.    | fur. | rd. | ft. | in. |
|-------|------|-----|-----|-----|
| 20    | 0    | 0   | 0   | 0   |
| 3     | 4    | 18  | 13  | 8   |
| <hr/> |      |     |     |     |
| 16    | 3    | 21  | 2½  | 4   |
| <hr/> |      |     |     |     |
|       |      |     |     | ½=6 |
| 16    | 3    | 21  | 2   | 10  |

NOTE. The half foot, which is 6 inches, is added to the 4 inches, and their sum is 10 inches.

(13.)

| A.    | R. | p. | ft. | in.  |
|-------|----|----|-----|------|
| 144   | 3  | 0  | 0   | 0    |
| 18    | 1  | 17 | 200 | 100  |
| <hr/> |    |    |     |      |
| 126   | 1  | 22 | 71½ | 44   |
| <hr/> |    |    |     |      |
|       |    |    |     | ½=36 |

126 1 22 71 80

NOTE. The ½ of a foot, which is 36 inches, is added to the 44 inches, and their sum is 80 inches.

(14.)

| cord. | ft. | in.  |
|-------|-----|------|
| 18    | 0   | 0    |
| 3     | 100 | 1000 |
| <hr/> |     |      |
| 14    | 27  | 728  |

(15.)

| A.    | R. | p. | ft. |
|-------|----|----|-----|
| 169   | 3  | 15 | 227 |
| 187   | 1  | 15 | 165 |
| <hr/> |    |    |     |
| 217   | 2  | 28 | 165 |
| <hr/> |    |    |     |
| 574   | 3  | 20 | 12½ |

(16.)

| cord. | ft. | in.  |
|-------|-----|------|
| 18    | 116 | 1000 |
| 17    | 111 | 1600 |
| <hr/> |     |      |
| 21    | 109 | 1716 |
| <hr/> |     |      |
| 58    | 82  | 860  |

(17.)

| T.    | ft. | in. |
|-------|-----|-----|
| 17    | 0   | 0   |
| 5     | 18  | 765 |
| <hr/> |     |     |
| 11    | 21  | 963 |

(18.)

| gal.  | qt. | pt. |
|-------|-----|-----|
| 169   | 0   | 0   |
| 76    | 3   | 1   |
| <hr/> |     |     |
| 92    | 0   | 1   |

(19.)

| ch.   | bu. | pk. | qt. |
|-------|-----|-----|-----|
| 17    | 18  | 0   | 0   |
| 5     | 20  | 1   | 7   |
| <hr/> |     |     |     |
| 11    | 33  | 2   | 1   |

(20.)

| y.    | mo. | d. | h. | m. | s. |
|-------|-----|----|----|----|----|
| 83    | 0   | 0  | 0  | 0  | 0  |
| 47    | 10  | 27 | 18 | 50 | 14 |
| <hr/> |     |    |    |    |    |
| 35    | 1   | 2  | 5  | 9  | 46 |

(21.)

| S.    | o  | /  | "  |
|-------|----|----|----|
| 11    | 15 | 36 | 15 |
| 5     | 18 | 50 | 18 |
| <hr/> |    |    |    |
| 5     | 26 | 45 | 57 |

(22.)

| gal.  | qt. | pt. |
|-------|-----|-----|
| 167   | 3   | 1   |
| 186   | 1   | 1   |
| <hr/> |     |     |
| 108   | 2   | 1   |
| 123   | 3   | 0   |
| <hr/> |     |     |
| 586   | 2   | 1   |

| (23.) |     |     |     | (24.) |     |    | (25.) |     |    |    |    |
|-------|-----|-----|-----|-------|-----|----|-------|-----|----|----|----|
| bu.   | pk. | qt. | pt. | y.    | mo. | d. | y.    | d.  | h. | m. | s. |
| 17    | 1   | 7   | 1   | 13    | 4   | 13 | 18    | 345 | 13 | 37 | 15 |
| 18    | 3   | 2   | 0   | 12    | 11  | 23 | 87    | 169 | 12 | 16 | 28 |
| 19    | 1   | 3   | 1   | 18    | 9   | 29 | 316   | 144 | 20 | 53 | 18 |
| 51    | 3   | 0   | 1   | 45    | 2   | 5  | 13    | 360 | 21 | 57 | 15 |
| 107   | 1   | 5   | 1   |       |     |    | 436   | 290 | 20 | 44 | 16 |

| (27.) |     |      |     | (28.) |     |     |
|-------|-----|------|-----|-------|-----|-----|
| lb.   | oz. | dwt. | gr. | yd.   | qr. | na. |
| 106   | 0   | 0    | 0   | 17    | 3   | 0   |
| 5     | 11  | 12   | 15  | 3     | 3   | 2   |
| 3     | 0   | 13   | 14  | 4     | 1   | 3   |
| 7     | 11  | 14   | 23  | 8     | 1   | 1   |
| 17    | 0   | 1    | 4   | 9     | 1   | 3   |
| 88    | 11  | 18   | 20  |       |     |     |

| (29.) |    |    |    | (30.) |    |    |    |
|-------|----|----|----|-------|----|----|----|
| s.    | o. | ′  | ″  | s.    | o. | ′  | ″  |
| 3     | 18 | 45 | 15 | 3     | 18 | 14 | 35 |
| 7     | 15 | 36 | 18 | 11    | 25 | 30 | 50 |
| 5     | 21 | 38 | 27 | 3     | 22 | 43 | 45 |
| 4     | 26 | 0  | 0  |       |    |    |    |

NOTE. As this question is in Motion, it is necessary to reject the 12s in the sum of the signs.

NOTE. To perform this question, we add 12 signs to the longitude of the star, and, from their sum subtract the longitude of the planet, because all the planets move eastward, as seen from the sun.

## MULTIPLICATION OF COMPOUND NUMBERS.

(ART. 106, p. 124.)

| (3.) |      |     |                          | (4.) |      |     |                              |
|------|------|-----|--------------------------|------|------|-----|------------------------------|
| m.   | fur. | rd. |                          | T.   | cwt. | qr. | lb.                          |
| 3    | 7    | 18  | $\times 30 = 5 \times 6$ | 2    | 7    | 3   | $18 \times 84 = 7 \times 12$ |
|      |      | 5   |                          |      |      |     | 7                            |
| 19   | 5    | 10  |                          | 16   | 15   | 1   | 14                           |
|      |      | 6   |                          |      |      |     | 12                           |
| 117  | 7    | 20  |                          | 201  | 4    | 2   | 0                            |

$$\begin{array}{r}
 \text{(5.)} \\
 \begin{array}{r}
 \text{yd.} \quad \text{qr.} \quad \text{na.} \\
 7 \quad 3 \quad 2 \times 72 = 6 \times 12 \\
 \hline
 6 \\
 47 \quad 1 \quad 0 \\
 \hline
 12 \\
 567 \quad 0 \quad 0
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(6.)} \\
 \begin{array}{r}
 \text{yd.} \quad \text{qr.} \quad \text{na.} \\
 3 \quad 2 \quad 1 \times 132 = 12 \times 11 \\
 \hline
 12 \\
 42 \quad 3 \quad 0 \\
 \hline
 11 \\
 470 \quad 1 \quad 0
 \end{array}
 \end{array}$$

(ART. 107, p. 125.)

NOTE. It is sometimes more convenient to use as multipliers the nearest composite numbers than to follow the Rule.

$$\begin{array}{r}
 \text{(2.)} \\
 \begin{array}{r}
 \text{lb.} \quad \text{oz.} \quad \text{dr.} \\
 17 \quad 10 \quad 13 \times 2 \\
 \hline
 10 \\
 176 \quad 12 \quad 2 \\
 \hline
 6 \\
 1060 \quad 8 \quad 12 = 60 \\
 35 \quad 5 \quad 10 = 2 \\
 1095 \quad 14 \quad 6 = 62
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(3.)} \\
 \begin{array}{r}
 \text{£.} \quad \text{s.} \quad \text{d.} \\
 2 \quad 17 \quad 9\frac{1}{2} \times 7 \\
 \hline
 10 \\
 28 \quad 17 \quad 11 \\
 \hline
 9 \\
 260 \quad 1 \quad 3 = 90 \\
 20 \quad 4 \quad 6\frac{1}{2} = 7 \\
 280 \quad 5 \quad 9\frac{1}{2} = 97
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(4.)} \\
 \begin{array}{r}
 \text{m.} \quad \text{fur.} \quad \text{rd.} \quad \text{yd.} \quad \text{ft.} \quad \text{in.} \\
 17 \quad 3 \quad 19 \quad 3 \quad 2 \quad 7 \times 8 \\
 \hline
 10 \\
 174 \quad 2 \quad 36 \quad 5 \quad 1 \quad 10 \\
 \hline
 3 \\
 523 \quad 0 \quad 30 \quad 5 \quad 2 \quad 6 = 30 \\
 139 \quad 3 \quad 37 \quad 2\frac{1}{2} \quad 2 \quad 8 = 8 \\
 662 \quad 4 \quad 28 \quad 3 \quad 2 \quad 2 = 38
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(5.)} \\
 \begin{array}{r}
 \text{bu.} \quad \text{pk.} \quad \text{qt.} \quad \text{pt.} \\
 27 \quad 3 \quad 6 \quad 1 \times 8 \\
 \hline
 10 \\
 279 \quad 2 \quad 1 \quad 0 \\
 \hline
 9 \\
 2515 \quad 3 \quad 1 \quad 0 = 90 \\
 223 \quad 2 \quad 4 \quad 0 = 8 \\
 2739 \quad 1 \quad 5 \quad 0 = 98
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(6.)} \\
 \begin{array}{r}
 \text{yd.} \quad \text{qr.} \quad \text{na.} \\
 7 \quad 3 \quad 2 \times 7 \\
 \hline
 10 \\
 78 \quad 3 \quad 0 \times 4 \\
 \hline
 10 \\
 787 \quad 2 \quad 0 \\
 \hline
 3 \\
 2362 \quad 2 \quad 0 = 300 \\
 315 \quad 0 \quad 0 = 40 \\
 55 \quad 0 \quad 2 = 7 \\
 2732 \quad 2 \quad 2 = 347
 \end{array}
 \end{array}$$

| (7.) |    |    |                  |     |       | (8.) |      |     |     |        |            |
|------|----|----|------------------|-----|-------|------|------|-----|-----|--------|------------|
| A.   | R. | p. | yd.              | ft. | in.   | T.   | cwt. | qr. | lb. | oz.    |            |
| 13   | 3  | 14 | 18               | 7   | 76    | 17   | 14   | 3   | 18  | 14     | $\times 1$ |
|      |    |    |                  |     | 9     |      |      |     |     | 10     |            |
| 124  | 2  | 11 | 17 $\frac{3}{4}$ | 4   | 108   | 177  | 9    | 0   | 20  | 12     | $\times 5$ |
|      |    |    |                  |     | 2     |      |      |     |     | 10     |            |
| 249  | 0  | 23 | 6 $\frac{1}{4}$  | 0   | 72=18 | 1774 | 11   | 3   | 11  | 8      |            |
| 13   | 3  | 14 | 18               | 7   | 76=1  |      |      |     |     | 4      |            |
| 262  | 3  | 37 | 24 $\frac{1}{4}$ | 8   | 4=19  | 7098 | 7    | 1   | 18  | 0=400  |            |
|      |    |    | $\frac{1}{4}=2$  | 36  |       | 887  | 5    | 3   | 19  | 12=50  |            |
| 262  | 3  | 37 | 25               | 1   | 40=19 | 17   | 14   | 3   | 18  | 14=1   |            |
|      |    |    |                  |     |       | 8003 | 8    | 1   | 0   | 10=451 |            |

## DIVISION OF COMPOUND NUMBERS.

(ART. 110, p. 127.)

| (2.)   |    |    | (3.)  |      |     | (4.)   |      |     |     |
|--------|----|----|-------|------|-----|--------|------|-----|-----|
| £.     | s. | d. | m.    | fur. | rd. | T.     | cwt. | qr. | lb. |
| 6)6409 | 10 | 0  | 5)117 | 7    | 20  | 12)201 | 4    | 2   | 0   |
| 6)1068 | 5  | 0  | 6)23  | 4    | 28  | 7)16   | 15   | 1   | 14  |
| 10)178 | 0  | 10 | 3     | 7    | 18  | 2      | 7    | 3   | 18  |
| 17     | 16 | 1  |       |      |     |        |      |     |     |

| (5.)  |     |     | (6.)   |     |     |
|-------|-----|-----|--------|-----|-----|
| yd.   | qr. | na. | yd.    | qr. | na. |
| 6)567 | 0   | 0   | 12)470 | 1   | 0   |
| 12)94 | 2   | 0   | 11)39  | 0   | 3   |
| 7     | 3   | 2   | 3      | 2   | 1   |





| (7.)          |    |    |     |     |         | (8.)            |      |     |     |        |
|---------------|----|----|-----|-----|---------|-----------------|------|-----|-----|--------|
| A.            | R. | p. | yd. | ft. | in.     | T.              | cwt. | qr. | lb. | oz.    |
| 19)262        | 3  | 37 | 25  | 1   | 40(13A. | 451)8003        | 8    | 1   | 0   | 10(17. |
| <u>19</u>     |    |    |     |     |         | <u>451</u>      |      |     |     |        |
| 72            |    |    |     |     |         | 3493            |      |     |     |        |
| <u>57</u>     |    |    |     |     |         | <u>3157</u>     |      |     |     |        |
| 15            |    |    |     |     |         | 336             |      |     |     |        |
| <u>4</u>      |    |    |     |     |         | <u>20</u>       |      |     |     |        |
| 19)63(3R.     |    |    |     |     |         | 451)6728(14cwt. |      |     |     |        |
| <u>57</u>     |    |    |     |     |         | <u>451</u>      |      |     |     |        |
| 6             |    |    |     |     |         | 2218            |      |     |     |        |
| <u>40</u>     |    |    |     |     |         | <u>1804</u>     |      |     |     |        |
| 19)277(14p.   |    |    |     |     |         | 414             |      |     |     |        |
| <u>19</u>     |    |    |     |     |         | <u>4</u>        |      |     |     |        |
| 87            |    |    |     |     |         | 451)1657(3qr.   |      |     |     |        |
| <u>76</u>     |    |    |     |     |         | <u>1353</u>     |      |     |     |        |
| 11            |    |    |     |     |         | 304             |      |     |     |        |
| <u>30½</u>    |    |    |     |     |         | <u>28</u>       |      |     |     |        |
| 355           |    |    |     |     |         | 451)8512(18lb.  |      |     |     |        |
| <u>2½</u>     |    |    |     |     |         | <u>451</u>      |      |     |     |        |
| 19)357½(18yd. |    |    |     |     |         | 4002            |      |     |     |        |
| <u>19</u>     |    |    |     |     |         | <u>3608</u>     |      |     |     |        |
| 167           |    |    |     |     |         | 394             |      |     |     |        |
| <u>152</u>    |    |    |     |     |         | <u>16</u>       |      |     |     |        |
| 15½           |    |    |     |     |         | 451)6314(14oz.  |      |     |     |        |
| <u>9</u>      |    |    |     |     |         | <u>451</u>      |      |     |     |        |
| 19)142½(7ft.  |    |    |     |     |         | 1804            |      |     |     |        |
| <u>133</u>    |    |    |     |     |         | <u>1804</u>     |      |     |     |        |
| 9½            |    |    |     |     |         |                 |      |     |     |        |
| <u>144</u>    |    |    |     |     |         |                 |      |     |     |        |
| 36            |    |    |     |     |         |                 |      |     |     |        |
| 36            |    |    |     |     |         |                 |      |     |     |        |
| 940           |    |    |     |     |         |                 |      |     |     |        |
| <u>108</u>    |    |    |     |     |         |                 |      |     |     |        |
| 1444          |    |    |     |     |         |                 |      |     |     |        |
| (Carried up.) |    |    |     |     |         |                 |      |     |     |        |
|               |    |    |     |     |         | (Brought up.)   |      |     |     |        |
|               |    |    |     |     |         | 19)1444(76in.   |      |     |     |        |
|               |    |    |     |     |         | <u>133</u>      |      |     |     |        |
|               |    |    |     |     |         | 114             |      |     |     |        |
|               |    |    |     |     |         | <u>114</u>      |      |     |     |        |

MISCELLANEOUS EXAMPLES IN MULTIPLICATION  
AND DIVISION OF COMPOUND NUMBERS.

(ART. 111, p. 129.)

(1.)

| cwt. | qr. | lb. |
|------|-----|-----|
| 8    | 3   | 20  |
|      |     | 5   |
| 44   | 2   | 16  |
|      |     | 6   |
| 267  | 3   | 12  |
| 67   | 3   | 12  |
| 200  | 0   | 0   |

| £.  | s. | d. |
|-----|----|----|
| 1   | 17 | 6  |
|     |    | 10 |
| 18  | 15 | 0  |
|     |    | 10 |
| 187 | 10 | 0  |
|     |    | 2  |
| 375 | 0  | 0  |

Ans.

(2.)

| A.       | R.      | p.   |
|----------|---------|------|
| 12)11067 | 1       | 8    |
| 12)922   | 1       | 4    |
|          | 76      | 3 17 |
|          | 4       |      |
|          | 307R.   |      |
|          | 40      |      |
|          | 12297p. |      |

| £. | s. | d. |
|----|----|----|
| 0  | 1  | 9½ |
|    |    | 10 |
| 0  | 17 | 11 |
|    |    | 10 |
| 8  | 19 | 2  |
|    |    | 10 |
| 89 | 11 | 8  |
|    |    | 10 |

(3.)

| m.   | fur. | rd. |
|------|------|-----|
| 18   | 7    | 32  |
|      |      | 10  |
| 189  | 6    | 0   |
|      |      | 10  |
| 1897 | 4    | 0   |

| m.   | fur. | rd. |
|------|------|-----|
| 2644 | 3    | 12  |
| 1897 | 4    | 0   |
| 746  | 7    | 12  |

Ans.

|      |      |    |          |
|------|------|----|----------|
| 895  | 16   | 8  | =10000   |
| 179  | 3    | 4  | = 2000   |
| 17   | 18   | 4  | = 200    |
| 8    | 1    | 3  | = 90     |
|      | 12   | 6½ | = 7      |
| Ans. | 1101 | 12 | 1½=12297 |

(4.)

| y.   |
|------|
| 1807 |
| 1798 |
| 9y.  |

| d.     |
|--------|
| 365    |
| 9      |
| 3285d. |

| h. | m.       |
|----|----------|
| 11 | 19 P. M. |
| 3  | 17 A. M. |
| 20 | 2        |

1 add for leap year.  
67 " from July 4 to  
3353 days. [Sept. 9.

Ans. 3353d. 20h. 2m.

(5.)

$$3124\text{rd.} \times 8 = 24992\text{rd.} = 78\text{m. } 0\text{fur. } 32\text{rd.}$$

|     |      |     |
|-----|------|-----|
| m.  | fur. | rd. |
| 121 | 5    | 0   |
| 78  | 0    | 32  |
|     |      |     |

$$\text{Ans. } 43 \quad 4 \quad 8$$

(6.)

|      |     |     |
|------|-----|-----|
| cwt. | qr. | lb. |
| 7    | 3   | 18  |
|      |     | 16  |
|      |     |     |

$$126 \quad 2 \quad 8 = 14176\text{lb.}$$

$$71 \quad 0 \quad 22$$

$$55 \quad 1 \quad 14 = 6202\text{lb.}$$

$$7974 \times 6 = \$478.44$$

$$6202 \times 7 = 434.14$$

$$\$912.58$$

$$14176 \times 5 = 708.80$$

$$\text{Ans. } \$203.78$$

|      |     |     |
|------|-----|-----|
| cwt. | qr. | lb. |
| 7    | 3   | 18  |
|      |     | 9   |
|      |     |     |

$$71 \quad 0 \quad 22 = 7974\text{lb.}$$

(7.)

|    |    |    |    |    |     |
|----|----|----|----|----|-----|
| £. | s. | d. | £. | s. | d.  |
| 17 | 18 | 10 | 1  | 17 | 6   |
|    |    | 17 |    |    | 144 |
|    |    |    |    |    |     |

$$305 \quad 0 \quad 2 \quad 270 \quad 0 \quad 0$$

$$207 \quad 0 \quad 0$$

$$35 \quad 0 \quad 2 \quad \text{Ans.}$$

(8.)

|    |      |     |    |      |     |
|----|------|-----|----|------|-----|
| m. | fur. | rd. | m. | fur. | rd. |
| 17 | 4    | 30  | 12 | 3    | 20  |
|    |      | 10  |    |      | 10  |
|    |      |     |    |      |     |

$$175 \quad 7 \quad 20 \quad 124 \quad 3 \quad 0$$

$$124 \quad 3 \quad 0$$

$$51 \quad 4 \quad 20$$

$$50$$

$$1 \quad 4 \quad 20 \quad \text{Ans.}$$

(9.)

$$\$5.75 \times 760 = \$4370;$$

$$\$4370 \div .02 = 218500\text{lb.};$$

$$218500\text{lb.} \div 2 = 109250\text{lb.};$$

$$109250\text{lb.} = 48\text{T. } 15\text{cwt. } 1\text{qr.}$$

$$22\text{lb.} \quad \text{Ans.}$$

(10.)

|    |    |    |     |
|----|----|----|-----|
| A. | R. | p. | ft. |
| 0  | 0  | 44 | 200 |
|    |    |    | 17  |
|    |    |    |     |

$$4 \quad 3 \quad 0 \quad 133$$

$$2 \quad 2 \quad 0 \quad 240$$

$$2 \quad 0 \quad 39 \quad 165\frac{1}{2}$$

|    |    |    |                |
|----|----|----|----------------|
| A. | R. | p. | ft.            |
| 2  | 0  | 39 | 165\frac{1}{2} |

$$165\frac{1}{2} = 97903\text{ft.}$$

$$1\text{s. } 2\frac{1}{2}\text{d.} \times 97903 = 5914\text{s. } 19\text{s. } 5\frac{1}{2}\text{d.} \quad \text{Ans.}$$

(11.)

$$100 \times 100 = 10000 \text{sq. rd.} \quad 3563 \times \$ 1.75 = \$ 6235.25 \text{ Ans.}$$

$$5A. 3R. 17p. = \frac{937}{50 \times 50 = 2500}$$

$$\frac{3000}{6437}$$

$$3563 \text{sq. rd.}$$

CANCELLATION.

(ART. 115, p. 132.)

$$3. \frac{27 \times 16}{27} = 16.$$

$$4. \frac{42 \times 19}{19} = 42.$$

$$5. \frac{2 \times 6 \times 3}{6 \times 3 \times 4} = 2.$$

$$6. \frac{17 \times 6 \times 2}{6 \times 2 \times 17} = 1.$$

$$7. \frac{15 \times 30 \times 10}{10 \times 15} = 30.$$

(ART. 116, p. 133.)

$$10. \frac{3 \times 2 \times 2 \times 14}{3 \times 4 \times 6 \times 7} = 4.$$

$$11. \frac{2 \quad 5 \quad 3}{16 \times 5 \times 10 \times 18} = \frac{2}{8 \times 6 \times 2 \times 12} = \frac{2}{2} [= 12\frac{1}{2}].$$

$$12. \frac{2 \quad 3 \quad 2}{22 \times 9 \times 12 \times 5} = 15. \frac{2}{3 \times 11 \times 6 \times 4}$$

$$13. \frac{5 \quad 2 \quad 9}{25 \times 7 \times 14 \times 36} = \frac{1}{4 \times 10 \times 21 \times 54} = \frac{1}{2 \quad 3 \quad 6} [= 1\frac{1}{6}].$$

$$14. \frac{2 \quad 3 \quad 9 \quad 2}{26 \times 72 \times 81 \times 12} = 3. \frac{2}{36 \times 18 \times 24 \times 54} = \frac{2}{4 \quad 6}$$

(ART. 117, p. 134.)

$$16. \frac{2 \quad 8 \times 4 \times 9 \times 2 \times 12 \times 16 \times 5}{4 \times 6 \times 6 \times 3 \times 8 \times 4 \times 20} = 2.$$

$$17. \frac{8 \quad 7}{6 \times 15 \times 16 \times 24 \times 12 \times 21 \times 27} = 8. \frac{2}{2 \times 10 \times 9 \times 8 \times 36 \times 7 \times 81}$$

## PROPERTIES AND RELATIONS OF NUMBERS.

|                        |        |     |    |
|------------------------|--------|-----|----|
| 2. (ART. 122, p. 136.) | 3      | 5.  | 7  |
| 3.                     | 2 or 4 | 6.  | 4  |
| 4.                     | 4      |     |    |
| 2. (ART. 124, p. 137.) | 5      | 7.  | 4  |
| 3.                     | 24     | 8.  | 12 |
| 4.                     | 1      | 9.  | 2  |
| 5.                     | 2      | 10. | 6  |
| 6.                     | 6      |     |    |

(ART. 128, p. 139.)

|    |                                                                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                                                                                                                            |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2. | $\begin{array}{r} 2 \overline{) 8 \ 4 \ 8 \ 6} \\ \underline{4 \phantom{00} 3} \phantom{00} \\ 2 \times 4 \times 3 = 24 \text{ Ans.} \end{array}$                                                                                                                                     | 6. | $\begin{array}{r} 6 \overline{) 8 \ 8 \ 12 \ 18 \ 24} \\ \underline{\phantom{00} 3 \phantom{00} 4} \phantom{00} \\ 6 \times 3 \times 4 = 72 \text{ Ans.} \end{array}$                                                                                                                                                                      |
| 3. | $\begin{array}{r} 7 \overline{) 7 \ 14 \ 21 \ 15} \\ \underline{\phantom{00} 2 \phantom{00} 8 \ 15} \phantom{00} \\ 7 \times 2 \times 15 = 210 \text{ Ans.} \end{array}$                                                                                                              | 7. | $\begin{array}{r} 2 \overline{) 10 \ 12 \ 16 \ 18 \ 20} \\ \underline{\phantom{00} 2 \phantom{00} 6 \ 8 \ 9 \ 10} \phantom{00} \\ 3 \overline{) 3 \ 4 \ 9 \ 5} \\ \underline{\phantom{00} 1 \phantom{00} 4 \phantom{00} 3 \phantom{00} 5} \phantom{00} \\ 2 \times 2 \times 3 \times 4 \times 3 \times 5 = 720 \text{ [Ans.]} \end{array}$ |
| 4. | $\begin{array}{r} 2 \overline{) 8 \ 4 \ 5 \ 6 \ 7 \ 8} \\ \underline{\phantom{00} 5 \phantom{00} 3 \phantom{00} 7 \phantom{00} 4} \phantom{00} \\ 2 \times 5 \times 3 \times 7 \times 4 = 840 \text{ Ans.} \end{array}$                                                               |    |                                                                                                                                                                                                                                                                                                                                            |
| 5. | $\begin{array}{r} 4 \overline{) 10 \ 12 \ 16 \ 20 \ 24} \\ \underline{\phantom{00} 2 \phantom{00} 4 \phantom{00} 5 \phantom{00} 6} \phantom{00} \\ \phantom{00} 2 \phantom{00} 5 \phantom{00} 3 \phantom{00} \\ 4 \times 2 \times 2 \times 5 \times 3 = 240 \text{ Ans.} \end{array}$ |    |                                                                                                                                                                                                                                                                                                                                            |

## VULGAR FRACTIONS.

|                        |               |     |                     |
|------------------------|---------------|-----|---------------------|
| 2. (ART. 135, p. 142.) | $\frac{1}{2}$ | 7.  | $\frac{111}{111}$   |
| 3.                     | $\frac{2}{3}$ | 8.  | $\frac{1}{1}$       |
| 4.                     | $\frac{1}{4}$ | 9.  | $\frac{1111}{1111}$ |
| 5.                     | $\frac{3}{5}$ | 10. | $\frac{111}{111}$   |
| 6.                     | $\frac{1}{2}$ |     |                     |

|                        |                      |     |                      |
|------------------------|----------------------|-----|----------------------|
| 2. (ART. 136, p. 143.) | $\frac{52}{7}$       | 10. | $\frac{360}{13}$     |
| 3.                     | $\frac{13}{4}$       | 11. | $\frac{12322}{1111}$ |
| 4.                     | $\frac{102}{11}$     | 12. | $\frac{124}{1}$      |
| 5.                     | $\frac{21}{11}$      | 13. | $\frac{150}{1}$      |
| 6.                     | $\frac{127}{12}$     | 14. | $\frac{874}{9}$      |
| 7.                     | $\frac{182}{18}$     | 15. | $\frac{343}{1}$      |
| 8.                     | $\frac{18842}{1111}$ | 16. | $\frac{1280}{15}$    |
| 9.                     | $\frac{5142}{117}$   |     |                      |
| 2. (ART. 137, p. 144.) | 12                   | 7.  | 1                    |
| 3.                     | $\frac{103}{17}$     | 8.  | 567                  |
| 4.                     | $\frac{10111}{11}$   | 9.  | $\frac{922}{1}$      |
| 5.                     | $\frac{1848}{11}$    | 10. | $\frac{4143}{153}$   |
| 6.                     | 1428                 |     |                      |

|                                                                                                                           |                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| (ART. 138, p. 145.)                                                                                                       |                                                                                                     |
| 3. $\frac{2}{3} \times \frac{4}{5} \times \frac{6}{7} = \frac{48}{105}$ Ans.                                              | 9. $\frac{3}{7} \times \frac{4}{11} \times \frac{7}{9} \times \frac{9}{10} \times \frac{13}{8} =$   |
| 4. $\frac{7}{8} \times \frac{9}{11} \times \frac{7}{1} = \frac{441}{88} = 5\frac{1}{8}$ [Ans.]                            | 5 [28 Ans.]                                                                                         |
| 5. $\frac{7}{8} \times \frac{9}{11} \times \frac{3}{8} \times \frac{4}{7} = \frac{27}{176}$ Ans.                          | 10. $\frac{15}{16} \times \frac{8}{9} \times \frac{7}{11} = \frac{35}{154}$ Ans.                    |
| 6. $\frac{11}{17} \times \frac{1}{2} \times \frac{3}{4} \times \frac{1}{20} \times \frac{7}{1} = \frac{231}{2720}$ [Ans.] | 11. $\frac{8}{11} \times \frac{22}{35} \times \frac{15}{22} \times \frac{77}{8} = 3$ [Ans.]         |
| 7. $\frac{3}{5} \times \frac{4}{11} \times \frac{11}{17} \times \frac{17}{23} \times \frac{23}{4} = \frac{3}{5}$ [Ans.]   | 12. $\frac{5}{7} \times \frac{3}{15} \times \frac{4}{16} \times \frac{35}{4} \times \frac{11}{5} =$ |
| 8. $\frac{1}{5} \times \frac{8}{9} \times \frac{9}{11} \times \frac{5}{8} \times \frac{3}{7} = \frac{3}{77}$ [Ans.]       | $\frac{11}{16}$ Ans.                                                                                |

(ART. 140, p. 147.)

|                                                          |                                                   |
|----------------------------------------------------------|---------------------------------------------------|
| 2. $\frac{3 \times 6 = 18 = \frac{18}{4} = \frac{9}{2}}$ | 3. $7 \times 5 \times 2 = 70 = \frac{70}{2} = 35$ |
| $\frac{5 \times 4 = 20 = \frac{20}{4} = 5}$              | $4 \times 9 \times 2 = 72 = \frac{72}{4} = 18$    |
| $\frac{4 \times 6 = 24}{4 \times 6 = 24}$                | $1 \times 9 \times 5 = 45 = \frac{45}{5} = 9$     |
|                                                          | $9 \times 5 \times 2 = 90$                        |



(6.)

$$\begin{array}{r} \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}, \frac{7}{8} \\ 2) 2 \ 4 \ 6 \ 8 \ 8 \ 12 \\ 3) 1 \ 2 \ 3 \ 4 \ 4 \ 6 \\ 2) 1 \ 2 \ 1 \ 4 \ 4 \ 2 \\ 2) 1 \ 1 \ 1 \ 2 \ 2 \ 1 \\ \hline \phantom{2) 1 \ 1 \ 1 \ 2 \ 2 \ 1} 1 \ 1 \ 1 \end{array}$$

$$2 \times 3 \times 2 \times 2 = 24$$

$$\begin{array}{r|l} 24 & \\ 2 & 12 \times 1 = 12 \\ 4 & 6 \times 3 = 18 \\ 6 & 4 \times 5 = 20 \\ 8 & 3 \times 5 = 15 \\ 8 & 3 \times 7 = 21 \\ 12 & 2 \times 5 = 10 \end{array}$$

$$\frac{12}{2}, \frac{12}{4}, \frac{24}{6}, \frac{12}{8}, \frac{21}{8}, \frac{10}{12} \text{ Ans.}$$

(7.)

$$\begin{array}{r} \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7} \\ 3) 9 \ 3 \ 3 \ 4 \ 6 \ 12 \\ 2) 3 \ 1 \ 1 \ 4 \ 2 \ 4 \\ 2) 3 \ 1 \ 1 \ 2 \ 1 \ 2 \\ \hline \phantom{2) 3 \ 1 \ 1 \ 2 \ 1 \ 2} 3 \ 1 \ 1 \ 1 \ 1 \ 1 \end{array}$$

$$3 \times 2 \times 2 \times 3 = 36$$

$$\begin{array}{r|l} 36 & \\ 9 & 4 \times 4 = 16 \\ 3 & 12 \times 2 = 24 \\ 3 & 12 \times 1 = 12 \\ 4 & 9 \times 1 = 9 \\ 6 & 6 \times 1 = 6 \\ 12 & 3 \times 1 = 3 \end{array}$$

$$\frac{16}{9}, \frac{24}{3}, \frac{12}{3}, \frac{9}{4}, \frac{6}{6}, \frac{3}{12} \text{ Ans.}$$

(8.)

$$\begin{array}{r} \frac{5}{6}, \frac{4}{5}, \frac{7}{12} \\ 3) 6 \ 9 \ 12 \\ 2) 2 \ 3 \ 4 \\ \hline \phantom{2) 2 \ 3 \ 4} 1 \ 3 \ 2 \end{array}$$

$$3 \times 2 \times 3 \times 2 = 36$$

$$\begin{array}{r|l} 36 & \\ 6 & 6 \times 5 = 30 \\ 9 & 4 \times 4 = 16 \\ 12 & 3 \times 7 = 21 \end{array}$$

$$\frac{30}{6}, \frac{16}{9}, \frac{21}{12} \text{ Ans.}$$

(9.)

$$7\frac{1}{2}, 5\frac{1}{11}, 7, 8 = \frac{3}{4}, \frac{11}{11}, \frac{7}{1}, \frac{8}{1}$$

$$4 \times 11 = 44$$

$$\begin{array}{r|l} 44 & \\ 4 & 11 \times 31 = 341 \\ 11 & 4 \times 61 = 244 \\ 1 & 44 \times 7 = 308 \\ 1 & 44 \times 8 = 352 \end{array}$$

$$\frac{341}{44}, \frac{244}{11}, \frac{308}{44}, \frac{352}{44} \text{ Ans.}$$

(10.)

$$\frac{3}{4}, 4, 5, 7, 9 = \frac{3}{4}, \frac{4}{1}, \frac{5}{1}, \frac{7}{1}, \frac{9}{1}$$

$$\begin{array}{r|l} 4 & \\ 4 & 1 \times 3 = 3 \\ 1 & 4 \times 4 = 16 \\ 1 & 4 \times 5 = 20 \\ 1 & 4 \times 7 = 28 \\ 1 & 4 \times 9 = 36 \end{array}$$

$$\frac{3}{4}, \frac{16}{4}, \frac{20}{4}, \frac{28}{4}, \frac{36}{4} \text{ Ans.}$$



|                        |                 |    |                 |
|------------------------|-----------------|----|-----------------|
| 2. (ART. 143, p. 149.) | $3\frac{1}{17}$ | 5. | $2\frac{1}{17}$ |
| 3.                     | $2\frac{1}{17}$ | 6. | $1\frac{1}{17}$ |
| 4.                     | $2\frac{1}{15}$ | 7. | $1\frac{1}{17}$ |

(ART. 144, p. 149.)

|                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (2.)                                                                                                                                                                                                                                                                                                                                              | (3.)                                                                                                                                                                                                                                                                                                                                                          |
| $\begin{array}{r} 4) 8 \quad 12 \quad 16 \\ 2) 2 \quad 3 \quad 4 \\ \hline 1 \quad 3 \quad 2 \end{array}$ $4 \times 2 \times 3 \times 2 = 48$ $\begin{array}{r} 48 \\ 8 \overline{) 6 \times 5 = 30} \\ 12 \overline{) 4 \times 11 = 44} \\ 16 \overline{) 3 \times 13 = 39} \\ \hline \end{array}$ $\frac{113}{48} = 2\frac{1}{16} \text{ Ans.}$ | $\begin{array}{r} 2) 20 \quad 18 \quad 14 \\ \hline 10 \quad 9 \quad 7 \end{array}$ $2 \times 10 \times 9 \times 7 = 1260$ $\begin{array}{r} 1260 \\ 20 \overline{) 63 \times 9 = 567} \\ 18 \overline{) 70 \times 11 = 770} \\ 14 \overline{) 90 \times 5 = 450} \\ \hline 1787 \\ 1260 \overline{) 1787} = 1\frac{527}{1260}, \\ \text{[Ans.]} \end{array}$ |

|                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (4.)                                                                                                                                                                                                             | (5.)                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| $21 \times 37 = 777$ $\begin{array}{r} 777 \\ 21 \overline{) 37 \times 19 = 703} \\ 37 \overline{) 21 \times 31 = 651} \\ \hline 1354 \\ 777 \overline{) 1354} = 1\frac{577}{777}, \\ \text{[Ans.]} \end{array}$ | $\begin{array}{r} 4) 4 \quad 6 \quad 8 \quad 12 \\ 3) 1 \quad 6 \quad 2 \quad 3 \\ 2) 1 \quad 2 \quad 2 \quad 1 \\ \hline 1 \quad 1 \quad 1 \quad 1 \end{array}$ $4 \times 2 \times 3 = 24$ $\begin{array}{r} 24 \\ 4 \overline{) 6 \times 3 = 18} \\ 6 \overline{) 4 \times 5 = 20} \\ 8 \overline{) 3 \times 3 = 9} \\ 12 \overline{) 2 \times 1 = 2} \\ \hline 49 \\ 24 \overline{) 49} = 2\frac{1}{24} \text{ Ans.} \end{array}$ |

|                                                                                                                                                                                 |                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (6.)                                                                                                                                                                            |                                                                                                                                                                                                                                                                   |
| $\begin{array}{r} 3) 9 \quad 21 \quad 24 \quad 2 \\ 2) 3 \quad 7 \quad 8 \quad 2 \\ \hline 3 \quad 7 \quad 4 \quad 1 \end{array}$ $3 \times 2 \times 3 \times 7 \times 4 = 504$ | $\begin{array}{r} 504 \\ 9 \overline{) 56 \times 4 = 224} \\ 21 \overline{) 24 \times 8 = 192} \\ 24 \overline{) 21 \times 11 = 231} \\ 2 \overline{) 252 \times 1 = 252} \\ \hline 899 \\ 504 \overline{) 899} = 1\frac{395}{504}, \\ \text{[Ans.]} \end{array}$ |

$$\begin{array}{r} \text{(7.)} \\ 12) 72 \quad 84 \quad 96 \\ \underline{2) 6 \quad 7 \quad 8} \\ 3 \quad 7 \quad 4 \end{array}$$

$$12 \times 2 \times 3 \times 7 \times 4 = 2016$$

$$\begin{array}{r} 2016 \\ 72 \mid 28 \times 19 = 532 \\ 84 \mid 24 \times 51 = 1224 \\ 96 \mid 21 \times 71 = 1491 \\ \hline 3247 \\ 2016 = 1\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2} \text{ [Ans.]} \end{array}$$

$$\begin{array}{r} \text{(8.)} \\ 25) 25 \quad 50 \quad 75 \quad 100 \\ \underline{2) 1 \quad 2 \quad 3 \quad 4} \\ 1 \quad 1 \quad 3 \quad 2 \end{array}$$

$$25 \times 2 \times 3 \times 2 = 300$$

$$\begin{array}{r} 300 \\ 25 \mid 12 \times 3 = 36 \\ 50 \mid 6 \times 49 = 294 \\ 75 \mid 4 \times 74 = 296 \\ 100 \mid 3 \times 81 = 243 \\ \hline 869 \\ 300 = 2\frac{1}{2}\frac{1}{2}\frac{1}{2} \text{ [Ans.]} \end{array}$$

$$\begin{array}{r} \text{(9.)} \\ 2) 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \\ \underline{2) 1 \quad 3 \quad 2 \quad 5 \quad 3 \quad 7 \quad 4} \\ 3) 1 \quad 3 \quad 1 \quad 5 \quad 3 \quad 7 \quad 2 \\ \hline 1 \quad 1 \quad 1 \quad 5 \quad 1 \quad 7 \quad 2 \end{array}$$

$$2 \times 2 \times 3 \times 5 \times 7 \times 2 = 840$$

$$\begin{array}{r} 840 \\ 2 \mid 420 \times 1 = 420 \\ 3 \mid 280 \times 2 = 560 \\ 4 \mid 210 \times 3 = 630 \\ 5 \mid 168 \times 4 = 672 \\ 6 \mid 140 \times 5 = 700 \\ 7 \mid 120 \times 6 = 720 \\ 8 \mid 105 \times 7 = 735 \\ \hline 4437 \\ 840 = 5\frac{7}{8}\frac{3}{4} \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{(10.)} \\ 3) 9 \quad 10 \quad 11 \quad 12 \quad 13 \quad 14 \quad 15 \\ \underline{2) 3 \quad 10 \quad 11 \quad 4 \quad 13 \quad 14 \quad 5} \\ 5) 3 \quad 5 \quad 11 \quad 2 \quad 13 \quad 7 \quad 5 \\ \hline 3 \quad 1 \quad 11 \quad 2 \quad 13 \quad 7 \quad 1 \end{array}$$

$$3 \times 2 \times 5 \times 3 \times 11 \times 2 \times 13 \times 7 = 180180$$

$$\begin{array}{r} 180180 \\ 9 \mid 20020 \times 8 = 160160 \\ 10 \mid 18018 \times 9 = 162162 \\ 11 \mid 16380 \times 10 = 163800 \\ 12 \mid 15015 \times 11 = 165165 \\ 13 \mid 13860 \times 12 = 166320 \\ 14 \mid 12870 \times 13 = 167310 \\ 15 \mid 12012 \times 14 = 168168 \\ \hline 1158085 \\ 180180 = 6\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2} \text{ Ans.} \end{array}$$

$$\begin{array}{r} \text{(11.)} \\ \frac{2}{3} \times \frac{2}{3} = \frac{4}{9} \\ \frac{2}{3} \times \frac{2}{3} = \frac{4}{9} \\ 2) 2 \quad 48 \\ \hline 1 \quad 24 \\ 2 \times 24 = 48 \end{array}$$

$$\begin{array}{r} 48 \\ 2 \mid 24 \times 1 = 24 \\ 48 \mid 1 \times 35 = 35 \\ \hline 59 \\ 48 = 1\frac{1}{2} \text{ Ans.} \end{array}$$

(12.)

$$\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}; \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

$$\begin{array}{r} 8 \overline{) 32 \ 24} \\ \underline{4 \ 3} \end{array}$$

$$8 \times 4 \times 3 = 96$$

$$\begin{array}{r} 96 \\ 32 \overline{) 3 \times 21 = 63} \\ 24 \overline{) 4 \times 11 = 44} \end{array}$$

$$\frac{107}{96} = 1\frac{11}{96} \text{ Ans.}$$

(13.)

$$\frac{1}{3} \times \frac{2}{3} = \frac{2}{9}; \frac{1}{3} \times \frac{7}{10} = \frac{7}{30}$$

$$27 \times 50 = 1350$$

$$\begin{array}{r} 1350 \\ 27 \overline{) 50 \times 2 = 100} \\ 50 \overline{) 27 \times 7 = 189} \\ \underline{289} \end{array} \text{ Ans.}$$

$$\frac{289}{1350} \text{ Ans.}$$

(14.)

$$\frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} = \frac{2}{5}$$

$$\frac{5}{6} \times \frac{6}{7} \times \frac{7}{10} = \frac{5}{10} = \frac{1}{2}$$

$$2 \times 5 = 10$$

$$\begin{array}{r} 10 \\ 5 \overline{) 2 \times 2 = 4} \\ 2 \overline{) 5 \times 1 = 5} \\ \underline{9} \end{array} \text{ Ans.}$$

$$\frac{9}{10} \text{ Ans.}$$

(16.)

$$3\frac{3}{4} = 3\frac{1}{2}; 4\frac{1}{4} = 4\frac{1}{2}$$

$$\begin{array}{r} 7 \overline{) 7 \ 14} \\ \underline{1 \ 2} \end{array}$$

$$7 \times 2 = 14$$

$$\begin{array}{r} 14 \\ 7 \overline{) 2 \times 24 = 48} \\ 14 \overline{) 1 \times 67 = 67} \end{array}$$

$$\frac{115}{14} = 8\frac{3}{14} \text{ Ans.}$$

(15.)

$$\frac{1}{3} \times \frac{3}{11} \times \frac{11}{12} = \frac{1}{12}$$

$$\frac{1}{2} \times \frac{2}{9} = \frac{1}{9}$$

$$\begin{array}{r} 3 \overline{) 12 \ 9} \\ \underline{4 \ 3} \end{array}$$

$$3 \times 4 \times 3 = 36$$

$$\begin{array}{r} 36 \\ 12 \overline{) 3 \times 1 = 3} \\ 9 \overline{) 4 \times 1 = 4} \end{array}$$

$$\frac{7}{36} \text{ Ans.}$$

(17.)

$$4\frac{3}{4} = 4\frac{3}{4}; 5\frac{1}{2} = 4\frac{1}{2}$$

$$4 \times 7 = 28$$

$$\begin{array}{r} 28 \\ 4 \overline{) 7 \times 19 = 133} \\ 7 \overline{) 4 \times 41 = 164} \end{array}$$

$$\frac{297}{28} = 10\frac{17}{28} \text{ Ans.}$$

$$\begin{array}{r}
 17\frac{1}{2} = 7\frac{1}{4} \quad 18\frac{1}{2} = 22\frac{1}{2} \quad (18.) \\
 \begin{array}{r}
 4 \overline{) 4 \ 12} \\
 \underline{1 \ 3} \\
 4 \times 3 = 12
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 4 \overline{) 12} \\
 \underline{12} \\
 3 \times 71 = 213 \\
 1 \times 221 = 221 \\
 \hline
 434 \\
 12 \overline{) 434} = 36\frac{1}{3} \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 2. (\text{ART. 147, p. 151.}) \quad \frac{1}{11} \overline{) 4.} \quad \frac{22}{11} \overline{) 6.} \quad \frac{22}{11} \overline{) 8.} \quad \frac{1}{10} \overline{) 4.} \\
 3. \quad \frac{1}{15} \overline{) 5.} \quad \frac{22}{11} \overline{) 7.} \quad \frac{22}{11} \overline{) 8.} \quad \frac{1}{10} \overline{) 4.}
 \end{array}$$

SUBTRACTION OF VULGAR FRACTIONS.

$$\begin{array}{r}
 (2.) \quad (\text{ART. 148, p. 152.}) \quad (5.) \\
 \frac{7}{8} - \frac{4}{8} \quad 3 \overline{) 18 \ 21} \quad \frac{11}{16} - \frac{1}{16} \quad 2 \overline{) 34 \ 10} \\
 3 \times 6 \times 7 = 126 \quad 6 \ 7 \quad 2 \times 17 \times 5 = 170 \quad 17 \ 5 \\
 \begin{array}{r}
 18 \overline{) 126} \\
 \underline{7 \times 7 = 49} \\
 21 \overline{) 6 \times 4 = 24} \\
 \underline{25} \\
 126 \text{ Ans.}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 (3.) \quad (6.) \\
 \frac{12}{8} - \frac{1}{8} \quad 4 \overline{) 20 \ 16} \quad \frac{31}{8} - \frac{2}{8} \quad 4 \overline{) 36 \ 16} \\
 4 \times 5 \times 4 = 80 \quad 5 \ 4 \quad 4 \times 9 \times 4 = 144 \quad 9 \ 4 \\
 \begin{array}{r}
 20 \overline{) 80} \\
 \underline{4 \times 19 = 76} \\
 16 \overline{) 5 \times 11 = 55} \\
 \underline{21} \\
 80 \text{ Ans.}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 (4.) \quad (7.) \\
 \frac{11}{4} - \frac{7}{4} \quad 4 \overline{) 24 \ 20} \quad \frac{12}{17} - \frac{3}{17} \quad 37 \times 11 = 407 \\
 4 \times 6 \times 5 = 120 \quad 6 \ 5 \quad \frac{12}{17} - \frac{3}{17} \quad 37 \times 11 = 407 \\
 \begin{array}{r}
 24 \overline{) 120} \\
 \underline{5 \times 17 = 85} \\
 20 \overline{) 6 \times 7 = 42} \\
 \underline{43} \\
 120 \text{ Ans.}
 \end{array}
 \end{array}$$

$$(8.) \quad 2\frac{1}{2} - \frac{1}{19} \quad 200 \times 19 = 3800$$

$$\begin{array}{r} 3800 \\ 200 \overline{) 19 \times 111 = 2109} \\ 19 \overline{) 200 \times 1 = 200} \\ \hline 1909 \\ \hline 3800 \text{ Ans.} \end{array}$$

$$(9.) \quad \frac{1}{10} - \frac{1}{1000} \quad 10 \overline{) 10 \ 1000}$$

$$10 \times 100 = 1000 \quad 1 \ 100$$

$$\begin{array}{r} 1000 \\ 10 \overline{) 100 \times 1 = 100} \\ 1000 \overline{) 1 \times 1 = 1} \\ \hline 99 \\ \hline 1000 \text{ Ans.} \end{array}$$

$$(10.) \quad \frac{2}{3} \times \frac{9}{11} = \frac{18}{33} = \frac{6}{11}; \frac{1}{4} \times \frac{2}{7} = \frac{2}{28} = \frac{1}{14}$$

$$\frac{6}{11} - \frac{1}{14} \quad 11 \times 14 = 154$$

$$\begin{array}{r} 154 \\ 11 \overline{) 14 \times 6 = 84} \\ 14 \overline{) 11 \times 1 = 11} \\ \hline 73 \\ \hline 154 \text{ Ans.} \end{array}$$

$$(11.) \quad \frac{1}{9} \times \frac{9}{10} = \frac{1}{10}; \frac{1}{12} \times \frac{12}{13} = \frac{1}{13}$$

$$\frac{1}{10} - \frac{1}{13} \quad 10 \times 13 = 130$$

$$\begin{array}{r} 130 \\ 10 \overline{) 13} \\ 13 \overline{) 10} \\ \hline 3 \\ \hline 130 \text{ Ans.} \end{array}$$

$$(12.) \quad \frac{3}{8} \times 12\frac{1}{2} = \frac{3}{8} \times \frac{25}{2} = \frac{75}{16} = 4\frac{11}{16};$$

$$\frac{2}{3} \times 9\frac{7}{12} = \frac{2}{3} \times \frac{115}{12} = \frac{230}{18} = 12\frac{5}{9}$$

$$4\frac{11}{16}; 12\frac{5}{9} - 4\frac{11}{16}$$

$$2 \times 8 \times 3 = 48 \quad \begin{array}{r} 2) 16 \ 6 \\ \hline 8 \ 3 \end{array}$$

$$\begin{array}{r} 48 \\ 16 \overline{) 3 \times 77 = 231} \\ 6 \overline{) 8 \times 23 = 184} \\ \hline 47 \\ \hline 48 \text{ Ans.} \end{array}$$

(ART. 149, p. 152.)

$$7. \text{ From } 23$$

$$\text{Take } 13\frac{1}{2}$$

$$\text{Ans. } 9\frac{1}{2}$$

$$8. \ 47$$

$$\frac{13}{28}$$

$$\text{Ans. } 46\frac{7}{28}$$

$$9. \ 139$$

$$75\frac{1}{2}$$

$$\text{Ans. } 63\frac{1}{2}$$

(ART. 150, p. 154.)

NOTE. In the following questions, the new numerator is found by multiplying each numerator by the denominator of the other fraction; and the common denominator is obtained by multiplying together the two denominators.

$$(12.) \quad 19\frac{1}{6} = 19\frac{11}{66}$$

$$7\frac{3}{11} = 7\frac{18}{66}$$

$$\text{Ans. } 11\frac{29}{66}$$

$$(13.) \quad 15\frac{1}{4} = 15\frac{3}{12}$$

$$8\frac{1}{4} = 8\frac{3}{12}$$

$$\text{Ans. } 6\frac{3}{12}$$

$$(14.) \quad 9\frac{1}{3} = 9\frac{19}{57}$$

$$3\frac{1}{3} = 3\frac{19}{57}$$

$$\text{Ans. } 5\frac{32}{57}$$

$$(15.) \quad 71\frac{1}{15} = 71\frac{12}{180}$$

$$13\frac{1}{12} = 13\frac{15}{180}$$

$$\text{Ans. } 57\frac{27}{180}$$

|                                 |                      |                               |
|---------------------------------|----------------------|-------------------------------|
| (16.)                           | (17.)                | (18.)                         |
| $61\frac{1}{4} = 61\frac{1}{4}$ | $63$                 | $2\frac{1}{2} = 2\frac{1}{2}$ |
| $33\frac{1}{4} = 33\frac{1}{4}$ | $12\frac{1}{2}$      | $3\frac{1}{4} = 3\frac{1}{4}$ |
| $1\frac{1}{4} = 1\frac{1}{4}$   |                      | $10$                          |
| Ans. $27\frac{1}{4}$            | Ans. $50\frac{1}{2}$ | Ans. $3\frac{1}{4}$           |

|                        |                  |     |                   |
|------------------------|------------------|-----|-------------------|
| 2. ART. 153, p. 155.)  | $6\frac{3}{4}$   | 8.  | $352\frac{1}{4}$  |
| 3.                     | $2\frac{3}{4}$   | 9.  | $43\frac{1}{2}$   |
| 4.                     | $1\frac{7}{8}$   | 10. | $\$7\frac{7}{8}$  |
| 5.                     | 49               | 11. | $\$0.42$          |
| 6.                     | $76\frac{1}{2}$  | 12. | $\$3.24$          |
| 7.                     | $166\frac{1}{2}$ | 13. | $\$69\frac{1}{2}$ |
| 2. (ART. 154, p. 156.) | 28               | 6.  | $243\frac{1}{4}$  |
| 3.                     | 88               | 7.  | $8\frac{3}{4}$    |
| 4.                     | 325              | 8.  | $23\frac{3}{4}$   |
| 5.                     | 1610             | 9.  | $6\frac{1}{4}$    |

(ART. 155, p. 157.)

|                      |                      |                      |
|----------------------|----------------------|----------------------|
| (3.)                 | (4.)                 | (5.)                 |
| $9\frac{3}{8}$       | $12\frac{3}{8}$      | $8\frac{1}{2}$       |
| 5                    | 7                    | 9                    |
| $45$                 | $84$                 | $72$                 |
| $1\frac{7}{8}$       | $4\frac{1}{2}$       | $8\frac{1}{4}$       |
| Ans. $46\frac{7}{8}$ | Ans. $88\frac{1}{2}$ | Ans. $80\frac{1}{4}$ |

|                      |                      |                        |
|----------------------|----------------------|------------------------|
| (6.)                 | (7.)                 | (8.)                   |
| $7\frac{1}{2}$       | $11\frac{1}{2}$      | $7\frac{1}{4}$         |
| 10                   | 8                    | 5                      |
| $70$                 | $88$                 | $35$                   |
| $1\frac{1}{2}$       | $6\frac{1}{2}$       | $2\frac{1}{4}$         |
| Ans. $71\frac{1}{2}$ | Ans. $94\frac{1}{2}$ | Ans. $\$37\frac{1}{4}$ |

|                         |                        |                        |
|-------------------------|------------------------|------------------------|
| (9.)                    | (10.)                  | (11.)                  |
| $23\frac{7}{12}$        | $8\frac{3}{8}$         | $\$6\frac{3}{8}$       |
| 6                       | 5                      | 9                      |
| $138$                   | $40$                   | $54$                   |
| $3\frac{1}{2}$          | $1\frac{1}{2}$         | $3\frac{3}{8}$         |
| Ans. $\$141\frac{1}{2}$ | Ans. $\$41\frac{1}{2}$ | Ans. $\$57\frac{3}{8}$ |

|                                                                                                                                              |                                                                                                                                                                       |                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (12.)<br>$\begin{array}{r} \$6.37\frac{1}{2} \quad 1 \\ 12 \quad 12 \\ \hline 76.44 \quad 2)12 \\ \hline 6 \quad 6 \end{array}$ Ans. \$76.50 | (13.)<br>$\begin{array}{r} \$9\frac{3}{8} \quad 3 \\ 11 \quad 11 \\ \hline 99 \quad 8)33 \\ \hline 4\frac{1}{8} \quad 4\frac{1}{8} \end{array}$ Ans. \$103\frac{1}{8} | (14.)<br>$\begin{array}{r} 4\frac{3}{8} \quad 3 \\ \$1.75 \quad \$1.75 \\ \hline 7.00 \quad 8)525 \\ \hline .65\frac{5}{8} \quad .65\frac{5}{8} \end{array}$ Ans. \$7.65\frac{5}{8} |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                                                                     |                                                                                                                                                                   |                                                                                                                                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (15.)<br>$\begin{array}{r} \$11\frac{7}{8} \quad 7 \\ 7 \quad 7 \\ \hline 77 \quad 8)49 \\ \hline 6\frac{1}{8} \quad 6\frac{1}{8} \end{array}$ Ans. \$83\frac{1}{8} | (16.)<br>$\begin{array}{r} \$10\frac{5}{8} \quad 5 \\ 9 \quad 9 \\ \hline 90 \quad 8)45 \\ \hline 5\frac{5}{8} \quad 5\frac{5}{8} \end{array}$ Ans. 95\frac{5}{8} | (17.)<br>$\begin{array}{r} \$3\frac{1}{8} \quad 1 \\ 5 \quad 5 \\ \hline 15 \quad 5 \\ \hline 0\frac{5}{8} \quad \frac{5}{8} \end{array}$ Ans. \$15\frac{5}{8} |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                                                                                 |                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| (18.)<br>$\begin{array}{r} \$7.62\frac{1}{2} \quad 1 \\ 15 \quad 15 \\ \hline 114.30 \quad 2)15 \\ \hline 7\frac{1}{2} \quad 7\frac{1}{2} \end{array}$ Ans. \$114.37\frac{1}{2} | (19.)<br>$\begin{array}{r} \$8.37\frac{1}{2} \quad 1 \\ 40 \quad 40 \\ \hline 334.80 \quad 2)40 \\ \hline 20 \quad 20 \end{array}$ Ans. \$335.00 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|

(ART. 156, p. 158.)

$$2. \frac{7}{8} \times \frac{8}{11} = \frac{7}{11} \text{ Ans.}$$

$$7. \frac{1}{9} \times \frac{8}{17} = \frac{8}{153} \text{ Ans.}$$

$$3. \frac{\frac{5}{11}}{\frac{11}{20}} = \frac{1}{4} \text{ Ans.}$$

$$8. \frac{\frac{6}{23}}{\frac{23}{36}} = \frac{1}{6} \text{ Ans.}$$

$$4. \frac{\frac{8}{13}}{\frac{13}{24}} = \frac{1}{3} \text{ Ans.}$$

$$9. \frac{7}{8} \times \frac{8}{9} = \frac{7}{9} \text{ Ans.}$$

$$5. \frac{\frac{18}{19}}{\frac{19}{90}} = \frac{1}{5} \text{ Ans.}$$

$$10. \frac{\frac{8}{11}}{\frac{11}{22}} = \frac{1}{4} \text{ Ans.}$$

$$6. \frac{\frac{15}{17}}{\frac{17}{60}} = \frac{1}{4} \text{ Ans.}$$

$$11. \frac{7}{10} \times \frac{3}{4} = \frac{21}{40} \text{ Ans.}$$

$$12. \frac{2}{3} \times \frac{3}{8} = \frac{1}{4}; \frac{7}{9} \times \frac{9}{11} = \frac{7}{11}; \frac{1}{4} \times \frac{7}{11} = \frac{7}{44} \text{ Ans.}$$

$$13. \frac{3}{9} \times \frac{4}{7} \times \frac{9}{11} = \frac{12}{77}; \frac{2}{3} \times \frac{18}{1} = \frac{12}{1}; \frac{12}{77} \times \frac{12}{1} = \frac{144}{77} =$$

[144 Ans.]

(ART. 157, p. 159.)

$$2. 7\frac{1}{2} \times 8\frac{3}{4} = \frac{15}{2} \times \frac{33}{4} = \frac{495}{8} = 60\frac{3}{8} \text{ Ans.}$$

$$3. 4\frac{1}{2} \times 9\frac{1}{4} = \frac{9}{2} \times \frac{37}{4} = \frac{333}{8} = 41\frac{5}{8} \text{ Ans.}$$

$$4. 11\frac{1}{2} \times 8\frac{1}{2} = \frac{23}{2} \times \frac{17}{2} = \frac{391}{2} = 99\frac{1}{2} \text{ Ans.}$$

$$5. 12\frac{3}{4} \times 11\frac{1}{2} = \frac{51}{4} \times \frac{23}{2} = \frac{1173}{8} = 146\frac{5}{8} \text{ Ans.}$$

$$6. 7\frac{1}{2} \times 5\frac{3}{8} = \frac{15}{2} \times \frac{43}{8} = \frac{645}{8} = 80\frac{5}{8} \text{ Ans.}$$

$$7. 7\frac{3}{8} \times 3\frac{1}{2} = \frac{59}{8} \times \frac{7}{2} = \frac{413}{8} = 51\frac{5}{8} \text{ Ans.}$$

$$8. 6\frac{3}{4} \times 23\frac{3}{4} = \frac{27}{4} \times \frac{95}{4} = \frac{2565}{16} = 160\frac{5}{16} \text{ Ans.}$$

$$9. 3\frac{3}{4} \times 9\frac{1}{8} = \frac{15}{4} \times \frac{19}{8} = \frac{285}{32} = 8\frac{21}{32} \text{ miles, Ans.}$$

$$10. 361\frac{1}{10} \times 25\frac{3}{8} = \frac{3611}{10} \times \frac{203}{8} = \frac{733033}{80} = 9162\frac{53}{80} \text{ Ans.}$$

$$11. 97\frac{5}{8} \times 49\frac{3}{4} = \frac{1557}{8} \times \frac{99}{4} = \frac{154143}{32} = 4816\frac{21}{32} \text{ rd. Ans.}$$

(ART. 159, p. 161.)

$$3. \frac{6}{13} \div 3 = \frac{2}{13} \text{ Ans.}$$

$$4. \frac{18}{19} \div 6 = \frac{3}{19} \text{ Ans.}$$

$$5. \frac{7}{11} \times 12 = 11\frac{1}{11} \text{ Ans.}$$

$$6. \frac{11}{12} \times 8 = 7\frac{1}{3} \text{ Ans.}$$

$$7. \frac{27}{43} \div 9 = \frac{3}{43} \text{ Ans.}$$

$$8. \frac{75}{98} \div 15 = \frac{5}{98} \text{ Ans.}$$

$$9. \frac{450}{533} \div 75 = \frac{6}{533} \text{ Ans.}$$

$$10. \frac{7}{9} \times 12 = 9\frac{1}{3} \text{ Ans.}$$

$$11. \frac{5}{7} \div 5 = \frac{1}{7} \text{ Ans.}$$



$$12. \frac{\overset{3}{9}}{\underset{5}{23}} \times 15 = 11\frac{2}{5} \text{ Ans.}$$

$$13. \frac{\overset{3}{6}}{\underset{14}{17}} \times 28 = 23\frac{3}{7} \text{ Ans.}$$

2. (ART. 160, p. 161.)  $18 \times 8 = 144$ ;  $144 \div 7 = 20\frac{4}{7}$  Ans.
3.  $27 \times 12 = 324$ ;  $324 \div 11 = 29\frac{5}{11}$  Ans.
4.  $23 \times 4 = 92$ ;  $92 \div 1 = 92$  Ans.
5.  $5 \times 5 = 25$ ;  $25 \div 1 = 25$  Ans.
6.  $12 \times 4 = 48$ ;  $48 \div 3 = 16$  Ans.
7.  $16 \times 2 = 32$ ;  $32 \div 1 = 32$  Ans.
8.  $100 \times 19 = 1900$ ;  $1900 \div 17 = 111\frac{3}{17}$  Ans.
9.  $50 \times 5 = 250$ ;  $250 \div 3 = 83\frac{1}{3}$  Ans.
10.  $60 \times 11 = 660$ ;  $660 \div 9 = 73\frac{1}{3}$  minutes, Ans.

2. (ART. 161, p. 162.)  $17\frac{2}{3} \div 7 = 2\frac{1}{3}$  Ans.
3.  $18\frac{2}{3} \div 8 = 2\frac{1}{4}$  Ans.
4.  $27\frac{1}{2} \div 9 = 3\frac{1}{10}$  Ans.
5.  $31\frac{1}{10} \div 11 = 2\frac{9}{110}$  Ans.
6.  $78\frac{1}{2} \div 12 = 6\frac{5}{8} = 6\frac{1}{2}$  Ans.
7.  $189\frac{1}{2} \div 4 = 47\frac{1}{8}$  Ans.
8.  $107\frac{1}{2} \div 3 = 35\frac{5}{6}$  Ans.
9.  $\$14\frac{2}{3} \div 7 = \$2\frac{2}{3}$  Ans.
10.  $106\frac{2}{3} \div 8 = \$13\frac{1}{2}$  Ans.
11.  $100 \times 25 = 2500$ ;  $2500 \div 72 = \$0.34\frac{1}{8}$  Ans.
12.  $3 \times 2 = 6$ ;  $6 \div 4 = 10$ ;  $107\frac{1}{11} \div 10 = \$10\frac{1}{11}$ , boy's share;  $\$10\frac{1}{11} \times 2 = \$21\frac{2}{11}$ , girl's share, Ans.
13.  $\frac{1}{10}$  of a ton is 17cwt.; and, if 17cwt. be divided by 14, the quotient will be 1cwt. 0qr. 24lb. Ans.

W<sub>M</sub>

2. (ART. 162, p. 165.)  $36 \times 8 = 288$ ;  $9\frac{1}{2} \times 8 = 79$ ;  $288 \div 79 = 3\frac{1}{2}$  Ans.
3.  $97 \times 12 = 1164$ ;  $13\frac{1}{2} \times 12 = 167$ ;  $1164 \div 167 = 6\frac{1}{2}$  Ans.
4.  $113 \times 7 = 791$ ;  $21\frac{1}{2} \times 7 = 148$ ;  $791 \div 148 = 5\frac{1}{148}$  Ans.
5.  $342 \times 131 = 44802$ ;  $14\frac{4}{11} \times 131 = 1881$ ;  $44802 \div 1881 = 23\frac{2}{11} = 23\frac{2}{11}$  Ans.

6.  $19 \times 7 = 133$ ;  $2\frac{3}{4} \times 7 = 17$ ;  $133 + 17 = 150$  pieces;

$$1\frac{1}{4} \times 2\frac{3}{4} = \frac{1\cancel{4}}{1\cancel{4}} \times \frac{1\cancel{7}}{\cancel{7}} = \frac{2}{1} = 2\text{ ft. Ans.}$$

(ART. 163, p. 164.)

2.  $\frac{1}{5} \times \frac{7}{4} = \frac{1\cancel{5}}{1\cancel{5}} = 1\frac{1}{4}$  Ans.

3.  $\frac{7}{\cancel{8}} \times \frac{4}{1} = \frac{7}{2} = 3\frac{1}{2}$  Ans.

4.  $\frac{13}{1\cancel{5}} \times \frac{4\cancel{2}}{11} = \frac{13}{11}$  Ans.

5.  $\frac{2}{3} \times \frac{1\cancel{2}}{3} = \frac{2\cancel{2}}{9} = 2\frac{2}{9}$  Ans.

6.  $\frac{1\cancel{2}}{1\cancel{2}} \times \frac{7}{1} = \frac{7}{1} = 7$  Ans.

7.  $\frac{4}{5} \times \frac{11}{\cancel{2}} = \frac{44}{5} = 8\frac{4}{5}$  Ans.

8.  $\frac{9}{1\cancel{3}} \times \frac{2\cancel{6}}{3} = \frac{6}{1} = 6$  Ans.

9.  $\frac{19}{2\cancel{0}} \times \frac{2\cancel{0}}{7} = \frac{19}{7} = 2\frac{5}{7}$  Ans.

10.  $\frac{2}{3} \times \frac{7}{\cancel{8}} \times \frac{7}{4} = \frac{7}{12}$ ;  $\frac{1}{7} \times \frac{2}{9} = \frac{2}{63}$ ;  $\frac{7}{1\cancel{2}} \times \frac{6\cancel{2}}{2} = \frac{14}{1} = 14$  Ans.

11.  $\frac{4}{\cancel{9}} \times \frac{6}{11} \times \frac{7}{1\cancel{6}} = \frac{7}{66}$ ;  $\frac{2}{3} \times \frac{7}{4} \times \frac{1}{9} = \frac{7}{54}$ ;  $\frac{7}{6\cancel{6}} \times \frac{9}{7} = \frac{1}{1} = 1$  Ans.

12.  $\frac{3}{4} \times \frac{5}{7} \times \frac{4}{\cancel{9}} = \frac{5}{21}$ ;  $\frac{2}{3} \times \frac{6}{7} \times \frac{2}{1\cancel{8}} = \frac{4}{63}$ ;  $\frac{5}{21} \times \frac{6\cancel{2}}{4} = \frac{5}{7}$  Ans.

2. (ART. 164.)  $7\frac{2}{3} = \frac{22}{3}$ ;  $4\frac{1}{2} = \frac{9}{2}$ ;  $\frac{59}{\cancel{8}} \times \frac{2}{9} = \frac{59}{36} = 1\frac{23}{36}$  Ans.

3.  $3\frac{1}{2} = \frac{7}{2}$ ;  $7\frac{1}{2} = \frac{15}{2}$ ;  $\frac{7}{2} \times \frac{2}{15} = \frac{7}{15}$  Ans.

$$4. 11\frac{1}{2} = \frac{23}{2}; 5\frac{2}{3} = \frac{16}{3}; \frac{23}{2} \times \frac{16}{3} = \frac{368}{6} = 61\frac{1}{3} \text{ Ans.}$$

$$5. 4\frac{2}{3} = \frac{14}{3}; 1\frac{2}{3} = \frac{5}{3}; \frac{14}{3} \times \frac{5}{3} = \frac{70}{9} = 7\frac{8}{9} \text{ Ans.}$$

$$6. 116\frac{2}{3} = \frac{349}{3}; 14\frac{1}{2} = \frac{29}{2}; \frac{349}{3} \times \frac{29}{2} = \frac{10121}{6} = 1686\frac{5}{6} \text{ Ans.}$$

$$7. 81\frac{1}{2} = \frac{163}{2}; 9\frac{1}{2} = \frac{19}{2}; \frac{163}{2} \times \frac{19}{2} = \frac{3097}{4} = 774\frac{1}{4} \text{ Ans.}$$

$$8. \frac{2}{3} \times \frac{1}{2} \times \frac{1}{3} = \frac{1}{9}; \frac{5}{8} \times \frac{33}{10} = \frac{165}{80} = \frac{33}{16}; \frac{33}{16} \times \frac{16}{23} = \frac{33}{23} = 1\frac{10}{23} \text{ Ans.}$$

(ART. 165, p. 165.)

$$4. \frac{12}{\frac{2}{3}} = \frac{12}{1} \times \frac{3}{2} = 18 \text{ [Ans.]} \quad 12. \frac{15}{\frac{3}{4}} = \frac{15}{1} \times \frac{4}{3} = 20 \text{ [Ans.]}$$

$$5. \frac{2}{14} = \frac{1}{7} \times \frac{1}{2} = \frac{1}{14} \text{ Ans.} \quad 13. \frac{\frac{3}{4}}{15} = \frac{3}{4} \times \frac{1}{15} = \frac{1}{20} \text{ Ans.}$$

$$6. \frac{47}{9} = \frac{47}{9} \times \frac{1}{1} = \frac{47}{9} \text{ Ans.} \quad 14. \frac{5\frac{1}{2}}{10} = \frac{11}{2} \times \frac{1}{10} = \frac{11}{20} \text{ Ans.}$$

$$7. \frac{8}{9\frac{3}{10}} = \frac{8}{\frac{93}{10}} = \frac{8}{1} \times \frac{10}{93} = \frac{80}{93} \text{ Ans.} \quad 15. \frac{6}{8\frac{1}{3}} = \frac{6}{\frac{25}{3}} = \frac{6}{1} \times \frac{3}{25} = \frac{18}{25} \text{ Ans.}$$

$$8. \frac{7}{4\frac{1}{2}} = \frac{7}{\frac{9}{2}} = \frac{7}{1} \times \frac{2}{9} = \frac{14}{9} \text{ Ans.} \quad 16. \frac{\frac{5}{6}}{7\frac{1}{2}} = \frac{5}{6} \times \frac{2}{31} = \frac{10}{186} = \frac{5}{93} \text{ Ans.}$$

$$9. \frac{6\frac{1}{2}}{\frac{2}{3}} = \frac{13}{2} \times \frac{3}{2} = \frac{39}{2} = 19\frac{1}{2} \text{ Ans.} \quad 17. \frac{8\frac{3}{4}}{\frac{2}{3}} = \frac{35}{4} \times \frac{3}{2} = \frac{105}{8} = 13\frac{1}{8} \text{ [Ans.]}$$

$$10. \frac{7\frac{1}{2}}{15\frac{1}{2}} = \frac{15}{31} \times \frac{2}{31} = \frac{30}{961} \text{ Ans.} \quad 18. \frac{9\frac{3}{5}}{12\frac{1}{2}} = \frac{48}{5} \times \frac{2}{25} = \frac{96}{125} \text{ Ans.}$$

$$11. \frac{3}{1\frac{1}{2}} = \frac{3}{\frac{3}{2}} = \frac{3}{1} \times \frac{2}{3} = 2 \text{ Ans.} \quad 19. \frac{9\frac{1}{2}}{12\frac{7}{8}} = \frac{19}{24} \times \frac{8}{103} \times \frac{1}{7} = \frac{19}{1861} \text{ [Ans.]}$$

$$20. \frac{3}{\frac{1}{2}} = \frac{3}{1} \times \frac{2}{1} = 6 \text{ Ans.}$$



$$11. \frac{7}{11} = 7 \times \frac{11}{11} = \frac{77}{11}; \frac{32}{74} = \frac{15}{4} \times \frac{2}{7} = \frac{155}{147}; \frac{188}{147} \times \frac{23}{11} = \frac{4324}{1617} \text{ Ans.}$$

$$12. \frac{3}{4} \times \frac{84}{64} = \frac{3}{4} \times \frac{11}{5} \times \frac{5}{32} = \frac{33}{128}; \frac{3}{4} \times \frac{7}{16} = \frac{4}{9} \times \frac{2}{7} \times \frac{1}{16} \\ = \frac{1}{128}; \frac{33}{128} \times \frac{1}{128} = \frac{1}{16384} \text{ Ans.}$$

$$13. \frac{32}{54} = \frac{7}{2} \times \frac{4}{23} = \frac{14}{23}; \frac{64}{24} = \frac{25}{4} \times \frac{2}{22} = \frac{25}{44}; \frac{225}{88} \times \frac{14}{23} \\ = \frac{1575}{1012} = 1\frac{563}{1012} \text{ Ans.}$$

$$14. \frac{4}{7} = 4 \times \frac{1}{7} = \frac{20}{14}; \frac{12}{11} = \frac{12}{11} \times \frac{1}{11} = \frac{9}{121}; \frac{20}{49} \times \frac{11}{60} = \frac{11}{147} \text{ Ans.}$$

$$15. \frac{34}{78} = \frac{25}{4} \times \frac{6}{47} = \frac{150}{238}; \frac{2}{7} = \frac{2}{7} \times \frac{1}{2} = \frac{1}{7}; \frac{150}{238} \times \frac{8}{21} = \frac{100}{1638} \text{ Ans.}$$

$$16. \frac{7}{11} \times 12\frac{1}{2} = \frac{7}{11} \times \frac{1}{2} \times \frac{25}{2} = \frac{175}{44}; \frac{1}{7\frac{1}{2}} \times 8\frac{1}{2} = \frac{1}{\frac{15}{2}} \times \frac{17}{2} \\ = \frac{2}{15} \times \frac{35}{4} = \frac{7}{15}; \frac{175}{44} \times \frac{18}{7} = \frac{825}{44} = 103\frac{1}{4} \text{ Ans.}$$

$$17. \frac{41}{31} = \frac{13}{4} \times \frac{5}{16} = \frac{65}{128}; \frac{51}{26} = \frac{21}{4} \times \frac{3}{13} = \frac{63}{52}; \frac{65}{128} \times \frac{63}{52} = \frac{1365}{1664}; \frac{61}{14} = \frac{13}{2} \times \frac{7}{11} = \frac{91}{22}; \frac{21}{8} = \frac{17}{8} \times \frac{3}{5} = \frac{153}{40};$$

$$\frac{1365}{1664} \times \frac{153}{40} = \frac{138825}{66560}; \frac{91}{22} \times \frac{153}{40} = \frac{13881}{1760} \text{ Ans.}$$

## MISCELLANEOUS EXERCISES IN VULGAR FRACTIONS.

(PAGE 168.)

1.  $76\frac{7}{8} = 122\frac{7}{8}$ ;  $18\frac{3}{4} = 7\frac{3}{4}$ ;  $\frac{1907}{25} \times \frac{75}{4} = 5721 = 1430\frac{1}{2}$ p.  
= 8A. 3R. 30 $\frac{1}{2}$ p. Ans.
2.  $7\frac{3}{4} = 2\frac{1}{2}$ ;  $1\frac{3}{4} = \frac{1}{2}$ ;  $1\frac{1}{4} = \frac{1}{2}$ ;  $\frac{31}{4} \times \frac{7}{4} \times \frac{5}{4} \times \frac{10}{1} = 543\frac{5}{8}$   
= 169 $\frac{1}{2}$  cubic feet. Ans.
3.  $\frac{7}{11}$  of an acre = 2R. 21p. 222 $\frac{3}{4}$ ft. From this we subtract  
20p. 200ft.; and there remain 2R. 1p. 22 $\frac{3}{4}$ ft. =  
22075ft. Ans.
4.  $1\frac{1}{3} \times 1\frac{10}{11} \times 1\frac{1}{2} = 208\frac{2}{3} = \$236.92\frac{4}{5}$  Ans.
5.  $15\frac{3}{4} = 6\frac{3}{4}$ ;  $\frac{3}{19} \times \frac{20}{1} \times \frac{63}{4} = 24\frac{5}{8} = \$49.73\frac{1}{8}$  Ans.
6.  $14\frac{2}{5} = 7\frac{2}{5}$ ;  $11\frac{3}{7} = 2\frac{2}{7}$ ;  $5\frac{4}{9} = 4\frac{4}{9}$ ;  $10\frac{1}{4} = 4\frac{1}{4}$ ;  $\frac{72}{5} \times \frac{80}{7} \times$   
 $\frac{40}{9} \times \frac{41}{4} = 9184$  Ans.
7.  $7 - 4 = 3$ ;  $\frac{7}{12} \times \frac{8}{7} = \frac{2}{3}$ ;  $\frac{112}{1} \times \frac{1}{4} = 28$ ;  $12\frac{3}{4} = 5\frac{1}{4}$ ;  
 $\frac{51}{4} \times \frac{28}{1} = 287 = \$3.57$  Ans.
8.  $19\frac{3}{4} = 17\frac{3}{4}$ ;  $7\frac{3}{8} = 5\frac{3}{8}$ ;  $\frac{136}{7} \times \frac{59}{8} = 109\frac{2}{7} = \$143\frac{3}{7}$  Ans.
9.  $13\frac{8}{11} = 15\frac{3}{11}$ ;  $3\frac{3}{4} = 1\frac{3}{4}$ ;  $\frac{1532}{11} \times \frac{1}{4} = 230\frac{2}{11}$  =  
\$512 $\frac{3}{11}$  Ans.

$$10. 7\frac{7}{10} = 7\frac{14}{20}; 9\frac{1}{2} = 9\frac{10}{20}; 7\frac{14}{20} + 9\frac{10}{20} = 17\frac{24}{20} = 18\frac{6}{5};$$

$$78\frac{3}{8} = 22\frac{1}{2}; \frac{1057}{60} \times \frac{627}{8} = \frac{220213}{160} = \$1380.70\frac{1}{2} \text{ Ans.}$$

$$11. 175\frac{3}{8} = 21\frac{3}{4}; \frac{3}{8} - \frac{2}{8} = \frac{1}{8}; 21\frac{3}{4} \times \frac{1}{8} = 2\frac{15}{8}; \frac{3}{8} - \frac{2}{8} = \frac{1}{8};$$

$$2\frac{15}{8} \times \frac{1}{8} = 2\frac{15}{64}; 8\frac{3}{4} = 8\frac{6}{8}; \frac{1756}{75} \times \frac{35}{4} = 20\frac{1}{15} =$$

$$\$2.04\frac{1}{3} \text{ Ans.}$$

$$12. 475 \div 3 = 158\frac{1}{3}; 158\frac{1}{3} \times .08 = \$12.66\frac{2}{3}; 475 - 158\frac{1}{3} = 316\frac{2}{3}; \frac{2}{3} \times 316\frac{2}{3} = 211\frac{1}{3}; 211\frac{1}{3} \times .10 = \$21.11\frac{1}{3};$$

$$316\frac{2}{3} - 211\frac{1}{3} = 105\frac{1}{3}; 105\frac{1}{3} \times .12 = \$13.19\frac{1}{3} \text{ Ans.}$$

$$\$21.11\frac{1}{3} + \$12.66\frac{2}{3} + \$13.19\frac{1}{3} = \$46.97\frac{2}{3}; \$46.97\frac{2}{3} - \$30.00 = \$16.97\frac{2}{3}, \text{ Green's bargain, Ans.}$$

$$13. 14\frac{3}{7} = 19\frac{1}{7}; \frac{14}{101} \times \frac{101}{7} = \$2.00 \text{ Ans.}$$

$$14. \frac{7}{8} \times \frac{8}{11} \times \frac{11}{14} = \frac{1}{2}; \frac{5}{17} \times \frac{17}{19} \times \frac{19}{25} = \frac{1}{5}; \frac{1}{2} \times \frac{1}{5} = \frac{1}{10} \text{ [Ans.]}$$

$$15. 11\frac{3}{4} = 4\frac{1}{2}; 4\frac{1}{2} = 1\frac{1}{2}; 1\frac{1}{2} \times 1\frac{1}{2} = 2\frac{1}{4} = 49\frac{1}{4} \text{ sq. in. Ans.}$$

$$16. 18\frac{3}{7} = 12\frac{2}{7}; 9\frac{1}{10} = \frac{18}{20}; 12\frac{2}{7} \times \frac{18}{20} = 12\frac{1}{5} = 178\frac{1}{5} \text{ rods, Ans.}$$

$$17. 19\frac{3}{4} = 7\frac{3}{4}; 17\frac{3}{4} = 7\frac{3}{4}; 7\frac{3}{4} \times 7\frac{3}{4} = 59\frac{9}{16} = \$350\frac{9}{16} \text{ Ans.}$$

$$18. 14\frac{7}{10} = 28\frac{7}{10}; 7\frac{3}{4} = 3\frac{1}{4}; 28\frac{7}{10} \times 3\frac{1}{4} = 28\frac{7}{10} \times \frac{13}{4} = \$111\frac{1}{4} \text{ Ans.}$$

$$19. 13\frac{1}{10} = 27\frac{1}{10}; 8\frac{1}{2} = 7\frac{1}{2}; 27\frac{1}{10} \times 7\frac{1}{2} = 192\frac{1}{10} = \$120\frac{1}{10} \text{ Ans.}$$

$$20. 1\frac{1}{8} = \frac{15}{12}; 1\frac{1}{8} = \frac{15}{12}; \frac{15}{12} \times \frac{15}{12} = 2\frac{25}{12} = \$3\frac{1}{4} \text{ Ans.}$$

$$21. \frac{9}{16} \times \frac{100}{1} = 22\frac{1}{4} = \$0.56\frac{1}{4} \text{ Ans.}$$

$$22. \frac{17}{80} \times \frac{100}{1} = 2\frac{1}{4} = \$0.21\frac{1}{4} \text{ Ans.}$$

$$23. \frac{41}{160} \times \frac{100}{1} = \frac{4100}{160} = 25\frac{5}{8} = \$0.25\frac{5}{8} \text{ Ans.}$$

$$24. \frac{33}{64} \times \frac{100}{1} = \frac{3300}{64} = 51\frac{3}{8} = \$0.51\frac{3}{8} \text{ Ans.}$$

$$25. \text{As } \frac{3}{8} \text{ leaked out, } \frac{5}{8} \text{ remained in the cask, therefore } 87\frac{1}{2} = 17\frac{1}{2}; \frac{5}{8} \times 17\frac{1}{2} = 8\frac{7}{8}; 27\frac{1}{2} = 5\frac{1}{2}; 8\frac{7}{8} \times 5\frac{1}{2} = 48\frac{1}{2} = \$15.03\frac{1}{2} \text{ Ans.}$$

$$26. 7\frac{3}{8} = 5\frac{3}{8}; 3\frac{7}{8} = 3\frac{1}{8}; 5\frac{3}{8} \times 3\frac{1}{8} = 18\frac{2}{8}; 4\frac{3}{8} = 3\frac{5}{8}; 5\frac{3}{8} \times 3\frac{5}{8} = 20\frac{15}{8}; 20\frac{15}{8} - 18\frac{2}{8} = 2\frac{13}{8} = \$3.68\frac{1}{2} \text{ Ans.}$$

$$27. 47\frac{1}{11} = 52\frac{2}{11}; 29\frac{7}{16} = 47\frac{1}{16}; \frac{522}{11} \times \frac{471}{16} = \frac{122931}{8} =$$

$$1396\frac{3}{8} \text{ square rods; } 5 \times 5 = 25; 25 \div 5 = 30; 1396\frac{3}{8} - 30 = 1366\frac{3}{8} \text{ square rods, Ans.}$$

$$28. 48\frac{1}{8} = 7\frac{9}{8}; 7\frac{9}{8} \times 2\frac{7}{8} = 15\frac{63}{8} = 4722\frac{1}{8} \text{ square rods; } 18\frac{5}{12} = 2\frac{21}{12}; 14\frac{3}{8} = 1\frac{15}{8}; 2\frac{21}{12} \times 1\frac{15}{8} = 264\frac{7}{8} \text{ square rods; } 4722\frac{1}{8} - 264\frac{7}{8} = 4457\frac{3}{8}; 4457\frac{3}{8} \times \$3.75 = \$16717.30\frac{1}{2} \text{ Ans.}$$

$$29. 7\frac{3}{4} = 3\frac{1}{4}; 4\frac{5}{12} = 1\frac{5}{12}; 3\frac{5}{8} = 2\frac{3}{8}; 3\frac{1}{4} \times 1\frac{5}{12} \times 2\frac{3}{8} = 3\frac{7}{8};$$

$$\frac{37789}{288} \times \frac{100}{1} = \frac{3778900}{288} = 13121\frac{17}{144} \text{ feet, Ans.}$$

$$30. \$17.87\frac{1}{2} \div 2 = \$8.93\frac{3}{4}. \text{ Now, if } \frac{2}{3} \text{ of this sum were given to the Bible Society, } \frac{1}{3} \text{ of it will remain; therefore, } \$8.93\frac{3}{4} \times \frac{1}{3} = \$3.57\frac{1}{4} \text{ Ans.}$$

$$31. 10\frac{1}{2} = 5\frac{1}{2}; 50 \times 5 = 250; 250 \div 54 = 4\frac{1}{2}; 12\frac{3}{4} - 4\frac{1}{2} = 8\frac{1}{4} \text{ Ans.}$$

$$32. 7\frac{3}{8} = 5\frac{3}{8}; 20 \times 8 = 160; 160 \div 59 = 2\frac{2}{59} \text{ Ans.}$$

$$33. 9\frac{7}{8} = 7\frac{9}{8}; \$4.62\frac{1}{2} = 2\frac{5}{8}; 7\frac{9}{8} \times 2\frac{5}{8} = 13\frac{45}{8} = \$45.67\frac{3}{8} \text{ Ans.}$$



$$34. 47\frac{1}{2} = 1\frac{1}{2} \times 1; \$12.37\frac{1}{2} = 24\frac{1}{2} \times 1; 12\frac{1}{2} = 1\frac{1}{2} \times 1; \frac{2475}{2} \times \frac{4}{191} \\ \times \frac{103}{8} = 254\frac{225}{64} = \$3.33\frac{11}{64} \text{ Ans.}$$

$$35. \$15.87\frac{1}{2} = 31\frac{1}{2} \times 1; 12\frac{1}{2} = 2\frac{1}{2} \times 1; \frac{3175}{2} \times \frac{8}{99} \times \frac{11}{1} = 121\frac{100}{9} \\ = \$14.11\frac{1}{9} \text{ Ans.}$$

$$36. \$19.18\frac{1}{2} = 76\frac{1}{2} \times 1; 3\frac{1}{2} = 2\frac{1}{2} \times 1; \frac{7675}{4} \times \frac{8}{27} \times \frac{3}{8} = 78\frac{1}{6} = \\ \$2.13\frac{1}{6} \text{ Ans.}$$

$$37. 8\frac{1}{2} = 1\frac{1}{2} \times 1; 3\frac{1}{2} = 1\frac{1}{2} \times 1; 2\frac{1}{2} = 1\frac{1}{2} \times 1; 1\frac{1}{2} \times 1\frac{1}{2} \times 1\frac{1}{2} = 1\frac{1}{8} \times 1\frac{1}{2} = 68\frac{1}{8} \text{ feet, Ans.}$$

38. If  $\frac{2}{3}$  of this field be planted with corn,  $\frac{1}{3}$  of the field will remain unplanted. And, if  $\frac{2}{3}$  of this remainder be sown with wheat, then there will remain  $\frac{1}{3}$  of the whole field; because, if  $\frac{2}{3}$  of  $\frac{1}{3} = \frac{2}{9}$  be taken from  $\frac{1}{3}$ , the remainder will be  $\frac{1}{9}$ ; thus,  $\frac{1}{3} = \frac{2}{9} + \frac{1}{9} = \frac{3}{9}$ . If, then,  $\frac{2}{3}$  of this  $\frac{1}{3}$  be planted with potatoes,  $\frac{1}{9}$  of the  $\frac{1}{3}$  will remain; and  $\frac{1}{9}$  of  $\frac{1}{3}$  is  $\frac{1}{27}$ . That is, the 3 rods square and the 3 square rods are  $\frac{1}{27}$  of the whole field; but 3 rods square are 9 square rods; and if, to these, we add the 3 square rods, the whole amount will be 12 square rods. If, then, 12 square rods be  $\frac{1}{27}$  of the field, 3 square rods will be  $\frac{1}{81}$  of the field; and, if  $\frac{1}{81}$  of the field be 3 rods,  $\frac{81}{3}$ , or the whole field, will be 63 times as much, that is,  $63 \times 3 = 189$  square rods = 1A. 0R. 29p. Ans. r

$$2. (\text{ART. 167, p. 171.}) \frac{1}{1400} \times \frac{20}{1} \times \frac{12}{1} \times \frac{4}{1} = \frac{2}{35} \text{ Ans.}$$

$$3. \frac{4}{25} \times \frac{12}{1} = \frac{48}{25} \text{ Ans.}$$

$$4. \frac{1}{\cancel{80}40} \times \frac{12}{1} \times \frac{20}{1} \times \frac{24}{1} = \frac{2}{3} \text{ Ans.}$$

$\frac{12}{720}$   
 $\frac{20}{36}$   
 $\frac{24}{3}$

$$5. \frac{1}{1728} \times \frac{4}{1} \times \frac{28}{1} \times \frac{16}{1} = \frac{28}{27} = 1\frac{1}{27} \text{ Ans}$$

$\frac{4}{432}$   
 $\frac{28}{27}$

$$6. \frac{1}{1320} \times \frac{40}{1} \times \frac{161}{1} = \frac{1}{2} \text{ Ans.}$$

$\frac{40}{33}$   
 $\frac{161}{2}$

$$7. \frac{1}{58080} \times \frac{160}{1} \times \frac{2721}{1} = \frac{2721}{363} = \frac{1232}{3} = \frac{2}{3} \text{ Ans.}$$

$\frac{160}{363}$

$$8. \frac{1}{89600} \times \frac{24}{1} \times \frac{60}{1} \times \frac{60}{1} = \frac{27}{11} \text{ Ans.}$$

$\frac{24}{11200}$   
 $\frac{60}{28}$

$$9. \frac{3}{14} \times \frac{4}{1} = \frac{2}{7} \text{ Ans.}$$

$\frac{4}{7}$

$$10. \frac{1}{200} \times \frac{4}{1} \times \frac{28}{1} = \frac{11}{14} \text{ Ans.}$$

$\frac{4}{50}$   
 $\frac{28}{25}$

$$2. (\text{ART. 168.}) \frac{4}{7} \times \frac{1}{24} \times \frac{1}{20} \times \frac{1}{12} = \frac{1}{10080} \text{ Ans.}$$

$\frac{4}{6}$

$$3. \frac{3}{10} \times \frac{1}{3} \times \frac{1}{8} = \frac{1}{80} \text{ Ans.}$$

$$4. \frac{4}{5} \times \frac{1}{16} \times \frac{1}{28} \times \frac{1}{4} \times \frac{1}{20} = \frac{1}{11200} \text{ Ans.}$$

$\frac{4}{4}$

5.  $\frac{8}{9} \times \frac{1}{40} \times \frac{1}{8} = \frac{1}{360}$  Ans.
6.  $\frac{2}{3} \times \frac{1}{272\frac{1}{4}} \times \frac{1}{40} \times \frac{1}{4} = \frac{1}{853440}$  Ans.
7.  $\frac{24}{25} \times \frac{1}{60} \times \frac{1}{60} \times \frac{1}{24} = \frac{1}{80000}$  Ans.
8.  $\frac{4}{9} \times \frac{1}{272\frac{1}{4}} \times \frac{1}{40} \times \frac{1}{4} \times \frac{1}{3} = \frac{1}{284030}$
9.  $\frac{4}{7} \times \frac{1}{4} \times \frac{1}{63} \times \frac{1}{3} = \frac{1}{1323}$  Ans.
10. A solid foot contains 1728 cubic inches, and  $\frac{1}{4}$  of 1728 is 288. One sixth of a yard is 6 inches, and a cube whose sides measure 6 inches each contains  $6 \times 6 \times 6 = 216$  cubic inches, and 216 is  $\frac{3}{4}$  of 288; thus  $\frac{3}{4} \times \frac{1}{8} = \frac{3}{32}$  Ans.

(ART. 169, p. 173.)

| (2.)                       | (3.)                    | (4.)              |                            |
|----------------------------|-------------------------|-------------------|----------------------------|
| 7                          | 7                       | 3                 |                            |
| 4                          | 4                       | 4                 | (Brought up.)              |
| 9)28(3qr.                  | 9)28(3qr.               | 7)12(1R.          | 7)1089(155ft.              |
| 27                         | 27                      | 7                 | 7                          |
| 1                          | 1                       | 5                 | 38                         |
| 28                         | 4                       | 40                | 35                         |
| 9)28(3lb.                  | 9)4(0 $\frac{1}{3}$ na. | 7)200(28p.        | 39                         |
| 27                         |                         | 14                | 35                         |
| 1                          |                         | 60                | 4                          |
| 16                         |                         | 56                | 144                        |
| 9)16(1oz.                  |                         | 4                 | 7)576(82 $\frac{1}{2}$ in. |
| 9                          |                         | 272 $\frac{1}{4}$ | 56                         |
| 7                          |                         | 1089              | 16                         |
| 16                         |                         | (Carried up.)     | 14                         |
| 9)112(12 $\frac{1}{2}$ dr. |                         |                   | 2                          |
| 108                        |                         |                   |                            |
| 4                          |                         |                   |                            |

| (5.)        | (6.)        | (7.)         | (8.)           |
|-------------|-------------|--------------|----------------|
| <u>2</u>    | <u>3</u>    | <u>2</u>     | <u>7</u>       |
| 8           | 5           | 63           | 365½           |
| 9)16(1fur.  | 11)15(1qr.  | 7)126(18gal. | 11)2556¼(232d. |
| <u>9</u>    | <u>11</u>   | <u>7</u>     | <u>22</u>      |
| 7           | 4           | 56           | 35             |
| <u>40</u>   | <u>4</u>    | <u>56</u>    | <u>33</u>      |
| 9)280(31rd. | 11)16(1½na. |              | 26¾            |
| <u>27</u>   | <u>11</u>   |              | <u>22</u>      |
| 10          | 5           |              | 4¾             |
| 9           |             |              | 24             |
| 1           |             |              | 96             |
| <u>16½</u>  |             |              | <u>18</u>      |
| 9)16½(1ft.  |             |              | 11)114(10h.    |
| <u>9</u>    |             |              | <u>110</u>     |
| 7½          |             |              | 4              |
| <u>12</u>   |             |              | <u>60</u>      |
| 9)90(10in.  |             |              | 11)240(21m.    |
| <u>90</u>   |             |              | <u>22</u>      |
|             |             |              | 20             |
|             |             |              | 11             |
|             |             |              | 9              |
|             |             |              | <u>60</u>      |
|             |             |              | 11)540(49½s.   |
|             |             |              | <u>44</u>      |
|             |             |              | 100            |
|             |             |              | 99             |
|             |             |              | <u>1</u>       |

(ART. 170, p. 173.)

$$\begin{array}{lcl}
 \text{(2.)} & & \text{(3.)} \\
 4s. 8d. = 56 & = \frac{56}{70} \text{ Ans.} & 4cwt. 3qr. 12lb. = 544 \\
 1£. = 240 & & 1T. = \frac{544}{2240} = \frac{1}{7} \text{ Ans.}
 \end{array}$$

$$\begin{array}{lcl}
 \text{(4.)} & & \text{(5.)} \\
 2fur. 30rd. = 110 & = \frac{110}{77} \text{ Ans.} & 3R. 24p. = 144 \\
 2m. 3fur. 20rd. = 780 & & 2A. 2R. 32p. = 432 = \frac{1}{3} \text{ Ans.}
 \end{array}$$

$$\begin{array}{lcl} (6.) & & (7.) \\ 18\text{gal. } 2\text{qt.} = 74 & = \frac{37}{128} \text{ Ans.} & 8\text{d. } 17\text{h. } 20\text{m.} = 12560 \\ 1\text{hhd.} = 252 & & 30\text{d.} = 43200 = \frac{147}{440} \text{ Ans.} \end{array}$$

$$\begin{array}{lcl} (8.) & & (9.) \\ 5\text{yd. } 2\text{qr. } 2\text{na.} = 90 & & 3\text{yd.} = 3 \\ 13\text{yd. } 0\text{qr. } 2\text{na.} = 210 & = \frac{3}{7} \text{ Ans.} & 3\text{yd.} \times 3\text{yd.} = \frac{3}{9} = \frac{1}{3} \text{ Ans.} \end{array}$$

$$\begin{array}{lcl} (2.) & (\text{ART. 171, p. 174.}) & (3.) \\ \begin{array}{l} \frac{1}{11}\text{£.} = 7 \quad \frac{\text{s.}}{3} \quad \frac{\text{d.}}{1} \quad \frac{\text{far.}}{1} \\ \frac{1}{2}\text{s.} = \quad \quad \quad 8 \quad 2 \quad \frac{1}{2} \\ \hline \text{Ans. } 7 \quad 11 \quad 3 \frac{1}{2} \end{array} & & \begin{array}{l} \frac{1}{11}\text{T.} = \quad \text{T.} \quad \text{cwt.} \quad \text{qr.} \quad \text{lb.} \quad \frac{\text{lb.}}{1} \\ \frac{1}{2}\text{T.} = \quad \quad \quad 18 \quad 0 \quad 20 \frac{1}{11} \\ \frac{1}{2}\text{T.} = \quad \quad \quad 15 \quad 2 \quad 6 \frac{2}{3} \\ \frac{1}{4}\text{cwt.} = \quad \quad \quad \quad \quad 2 \quad 8 \\ \hline \text{Ans. } 1 \quad 14 \quad 1 \quad 6 \frac{2}{3} \end{array} \end{array}$$

$$\begin{array}{lcl} (4.) & & (5.) \\ \begin{array}{l} \text{yd.} \quad \text{qr.} \quad \text{na.} \quad \text{in.} \\ \frac{3}{4}\text{yd.} = \quad \quad 2 \quad 2 \quad 1 \frac{1}{2} \\ \frac{3}{4}\text{yd.} = \quad \quad 3 \quad 2 \quad 0 \frac{1}{2} \\ \frac{1}{4}\text{qr.} = \quad \quad \quad 1 \quad 1 \frac{1}{4} \\ \hline \text{Ans. } 1 \quad 2 \quad 2 \quad 0 \frac{1}{2} \end{array} & & \begin{array}{l} \text{fur.} \quad \text{rd.} \quad \text{yd.} \quad \text{ft.} \quad \text{in.} \\ \frac{1}{11}\text{m.} = 2 \quad 36 \quad 2 \quad 0 \quad 0 \\ \frac{1}{2}\text{m.} = 3 \quad 22 \quad 1 \quad 0 \quad 8 \\ \frac{1}{11}\text{fur.} = \quad \quad 10 \quad 5 \quad 0 \quad 0 \\ \frac{1}{11}\text{yd.} = \quad \quad \quad \quad \quad 1 \quad 10 \frac{1}{11} \\ \hline 6 \quad 29 \quad 2 \frac{1}{2} \quad 2 \quad 6 \frac{1}{11} \\ \frac{1}{2} = 1 \quad 6 \\ \hline \text{Ans. } 6 \quad 29 \quad 3 \quad 1 \quad 0 \frac{1}{11} \end{array} \end{array}$$

$$\begin{array}{lcl} (6.) & & (7.) \\ \begin{array}{l} \text{A.} \quad \text{R.} \quad \text{p.} \quad \text{ft.} \quad \text{in.} \\ \frac{2}{11}\text{A.} = \quad \quad 3 \quad 10 \quad 247 \quad 72 \\ \frac{1}{2}\text{R.} = \quad \quad \quad 0 \quad 194 \quad 66 \frac{2}{3} \\ \frac{1}{2}\text{p.} = \quad \quad \quad \quad 32 \quad 0 \quad 0 \\ \hline 1 \quad 0 \quad 3 \quad 168 \frac{2}{3} \quad 138 \frac{2}{3} \\ \frac{2}{3} = 108 \\ \hline \text{Ans. } 1 \quad 0 \quad 3 \quad 169 \quad 102 \frac{2}{3} \end{array} & & \begin{array}{l} \text{R.} \quad \text{p.} \quad \text{ft.} \\ \frac{1}{11}\text{A.} = 0 \quad 37 \quad 176 \frac{1}{11} \\ \frac{1}{2}\text{A.} = 0 \quad 22 \quad 233 \frac{1}{11} \\ \frac{2}{11}\text{A.} = 0 \quad 29 \quad 24 \frac{2}{11} \\ \frac{3}{4}\text{A.} = 1 \quad 28 \quad 155 \frac{3}{4} \\ \hline \text{Ans. } 3 \quad 38 \quad 45 \frac{9}{11} \end{array} \end{array}$$

$$\begin{array}{lcl} (2.) & (\text{ART. 172, p. 175.}) & (3.) \\ \begin{array}{l} \text{cwt.} \quad \text{qr.} \quad \text{lb.} \\ \frac{1}{2}\text{T.} = 11 \quad 1 \quad 20 \\ \frac{1}{11}\text{cwt.} = \quad \quad 1 \quad 11 \frac{1}{11} \\ \hline \text{Ans. } 11 \quad 0 \quad 8 \frac{1}{11} \end{array} & & \begin{array}{l} \text{fur.} \quad \text{rd.} \quad \text{ft.} \quad \text{in.} \\ \frac{1}{2}\text{m.} = 6 \quad 8 \quad 14 \quad 8 \\ \frac{1}{11}\text{fur.} = \quad \quad 15 \quad 9 \quad 2 \\ \hline \text{Ans. } 5 \quad 33 \quad 5 \quad 6 \end{array} \end{array}$$

$$\begin{array}{rcl}
 \frac{3}{11} \times 100 \text{ gal.} & (5.) & = \frac{\text{gal.}}{27} \frac{\text{qt.}}{1} \frac{\text{pt.}}{0 \frac{2}{3}} \\
 \frac{11}{11} - \frac{3}{11} = \frac{8}{11} \times \frac{3}{8} = \frac{3}{11} \times 100 \text{ gal.} & & = 48 \frac{1}{11} \times 100 \text{ gal.} = 48 \frac{1}{11} \times 100 \text{ gal.} \\
 & & \underline{75 \quad 3 \quad 0 \frac{2}{3}} \\
 \begin{array}{rcl}
 \frac{1}{11} \text{ A.} & \begin{array}{c} \text{R.} \\ \text{p.} \\ \text{ft.} \end{array} & \begin{array}{c} 3 \\ 25 \\ 123 \frac{3}{4} \end{array} \\
 \frac{3}{8} \text{ R.} & = & \begin{array}{c} 8 \\ 242 \end{array} \\
 \text{Ans.} & 3 & 16 \quad 154
 \end{array}
 \end{array}$$

$$\begin{array}{rcl}
 41 \text{ m.} \times \frac{3}{11} & (6.) & = \frac{\text{m.}}{11} \frac{\text{fur.}}{1} \frac{\text{rd.}}{18} \frac{\text{ft.}}{3} \frac{\text{in.}}{0} \\
 \frac{11}{11} - \frac{3}{11} = \frac{8}{11} \times \frac{3}{8} = \frac{3}{11} \times 41 \text{ m.} & & = \frac{17}{17} \frac{0}{0} \frac{12}{12} \frac{7}{7} \frac{8 \frac{1}{2}}{8 \frac{1}{2}} \\
 & & \underline{28 \quad 1 \quad 30 \quad 10 \quad 8 \frac{1}{2}} \\
 & & \underline{41 \quad 0 \quad 0 \quad 0 \quad 0} \\
 & & \underline{28 \quad 1 \quad 30 \quad 10 \quad 8 \frac{1}{2}} \\
 \text{Ans.} & 12 & 6 \quad 9 \quad 5 \quad 9 \frac{1}{2}
 \end{array}$$

$$\begin{array}{rcl}
 365 \text{ da.} \times \frac{3}{7} & (7.) & = \frac{\text{da.}}{52} \frac{\text{h.}}{3} \frac{\text{m.}}{25} \frac{\text{s.}}{42 \frac{3}{4}} \\
 \frac{7}{7} - \frac{3}{7} = \frac{4}{7} \times \frac{3}{4} = \frac{3}{7} \times 365 \text{ da.} & & = \frac{85}{85} \frac{7}{7} \frac{47}{47} \frac{31 \frac{1}{4}}{31 \frac{1}{4}} \\
 \text{Ans.} & 137 & 11 \quad 13 \quad 14 \frac{3}{4}
 \end{array}$$

## QUESTIONS PERFORMED BY ANALYSIS.

2. (p. 176.)  $\$7.80 \div 10 = \$0.78$ ;  $\$0.78 \times 3 = \$2.34$  Ans.
3.  $\$17.84 \div 8 = \$2.23$ ;  $\$2.23 \times 7 = \$15.61$  Ans.
4.  $\$786.63 \div 13 = \$60.51$ ;  $\$60.51 \times 11 = \$665.61$  Ans.
5.  $\$87.50 \div 12 = \$7.29 \frac{1}{2}$ ;  $\$7.29 \frac{1}{2} \times 11 = \$80.20 \frac{1}{2}$  Ans.
6.  $17 \text{ £. } 18 \text{ s. } 9 \text{ d.} \div 4 = 4 \text{ £. } 9 \text{ s. } 8 \frac{1}{2} \text{ d.}$ ;  $4 \text{ £. } 9 \text{ s. } 8 \frac{1}{2} \text{ d.} \times 3 = 13 \text{ £. } 9 \text{ s. } 0 \frac{1}{2} \text{ d.}$  Ans.
7.  $3 \text{ T. } 16 \text{ cwt. } 3 \text{ qr. } 23 \text{ lb.} \div 7 = 10 \text{ cwt. } 3 \text{ qr. } 27 \frac{1}{2} \text{ lb.}$ ;  $10 \text{ cwt. } 3 \text{ qr. } 27 \frac{1}{2} \text{ lb.} \times 4 = 2 \text{ T. } 3 \text{ cwt. } 3 \text{ qr. } 25 \frac{1}{2} \text{ lb.}$  Ans.
8.  $27 \text{ A. } 3 \text{ R. } 33 \text{ p.} \div 9 = 3 \text{ A. } 0 \text{ R. } 17 \text{ p.}$ ;  $3 \text{ A. } 0 \text{ R. } 17 \text{ p.} \times 4 = 12 \text{ A. } 1 \text{ R. } 28 \text{ p.}$  Ans.
10.  $\$2.34 \div 3 = \$0.78$ ;  $\$0.78 \times 10 = \$7.80$  Ans.
11.  $\$15.57 \frac{1}{2} \div 7 = \$2.22 \frac{1}{2}$ ;  $\$2.22 \frac{1}{2} \times 8 = \$17.80$  Ans.
12.  $\$665.50 \div 11 = \$60.50$ ;  $\$60.50 \times 13 = \$786.50$  Ans.

$$13. \$73.60\frac{1}{2} \div 11 = \$6.69\frac{1}{2}; \$6.69\frac{1}{2} \times 12 = \$80.30 \text{ Ans.}$$

$$14. 13\text{£. } 9\text{s. } 0\frac{1}{2}\text{d.} \div 3 = 4\text{£. } 9\text{s. } 8\frac{1}{2}\text{d.}; 4\text{£. } 9\text{s. } 8\frac{1}{2}\text{d.} \times 4 = 17\text{£. } 18\text{s. } 9\text{d.} \text{ Ans.}$$

$$15. 18\text{cwt. } 0\text{qr. } 12\text{lb.} \div 4 = 4\text{cwt. } 2\text{qr. } 3\text{lb.}; 4\text{cwt. } 2\text{qr. } 3\text{lb.} \times 17 = 76\text{cwt. } 3\text{qr. } 23\text{lb.} \text{ Ans.}$$

$$16. 12\text{A. } 1\text{R. } 30\frac{1}{2}\text{p.} \div 4 = 3\text{A. } 0\text{R. } 17\frac{3}{8}\text{p.}; 3\text{A. } 0\text{R. } 17\frac{3}{8}\text{p.} \times 9 = 27\text{A. } 3\text{R. } 39\frac{1}{4}\text{p.} \text{ Ans.}$$

$$17. \$80.20\frac{1}{2} \div 11 = \$7.29\frac{1}{2}; \$7.29\frac{1}{2} \times 12 = \$87.50 \text{ Ans.}$$

$$19. \$2.52 \div 7 = \$0.36; \$0.36 \times 11 = \$3.96; \$3.96 \div 9 = \$0.44; \$0.44 \times 4 = \$1.76 \text{ Ans.}$$

$$20. \$80.00 \div 3 = \$26.66\frac{2}{3}; \$26.66\frac{2}{3} \times 4 = \$106.66\frac{2}{3}; \\ \$106.66\frac{2}{3} \div 8 = \$13.33\frac{1}{3}; \$13.33\frac{1}{3} \times 7 = \$93.33\frac{1}{3} \text{ Ans.}$$

$$21. \$631.89 \div 9 = \$70.21; \$70.21 \times 16 = \$1123.36; \\ \$1123.36 \div 14 = \$80.24; \$80.24 \times 5 = \$401.20 \text{ Ans.}$$

$$22. \$141.52 \div 4 = \$35.38; \$35.38 \times 5 = \$176.90; \$176.90 \div 29 = \$6.10; \$6.10 \times 5 = \$30.50 \text{ Ans.}$$

$$23. \$1728 \div 3 = \$576; \$576 \times 8 = \$4608; \frac{5}{8} - \frac{3}{8} = \frac{1}{4}; \\ \frac{5}{8} \times \frac{4}{5} = \frac{1}{2}; \$4608 \times \frac{1}{2} = \$2304 \text{ Ans.}$$

$$24. \$82.80 \div 4 = \$20.70; \$20.70 \times 7 = \$144.90; \frac{7}{7} - \frac{4}{7} = \frac{3}{7}; \frac{3}{7} \times \frac{2}{3} = \frac{2}{7}; \$144.90 \div 7 = \$20.70; \$20.70 \times 2 = \$41.40 \text{ Ans.}$$

$$25. 26\text{£. } 12\text{s. } 6\text{d.} \div 5 = 5\text{£. } 6\text{s. } 6\text{d.}; 5\text{£. } 6\text{s. } 6\text{d.} \times 9 = 47\text{£.}$$

$$18\text{s. } 6\text{d.}; \frac{5}{8} - \frac{3}{8} = \frac{1}{4}; \frac{4}{9} \times \frac{7}{8} = \frac{7}{18}; 47\text{£. } 18\text{s. } 6\text{d.} \div 2$$

$$18 = 2\text{£. } 13\text{s. } 3\text{d.}; 2\text{£. } 13\text{s. } 3\text{d.} \times 7 = 18\text{£. } 12\text{s. } 9\text{d.} \text{ Ans.}$$

$$27. \$49.00 \div 3 = \$16.33\frac{1}{3}; \$16.33\frac{1}{3} \div 11 = \$1.48\frac{1}{3}\frac{1}{3}; \\ \$1.48\frac{1}{3}\frac{1}{3} \times 81 = \$120.27\frac{3}{11} \text{ Ans.}$$

$$28. \$78.80 \div 11 = \$7.16\frac{4}{11}; \$7.16\frac{4}{11} \div 9 = \$0.79\frac{4}{9}\frac{2}{9}; \\ \$0.79\frac{4}{9}\frac{2}{9} \times 31 = \$24.67\frac{4}{9}\frac{2}{9} \text{ Ans.}$$

29.  $37\text{£. } 18\text{s. } 10\text{d.} + 3 = 12\text{£. } 12\text{s. } 11\frac{1}{2}\text{d.}; 12\text{£. } 12\text{s. } 11\frac{1}{2}\text{d.} + 8 = 1\text{£. } 11\text{s. } 7\frac{1}{2}\text{d.}; 1\text{£. } 11\text{s. } 7\frac{1}{2}\text{d.} \times 43 = 67\text{£. } 19\text{s. } 6\frac{1}{2}\text{d. Ans.}$
30.  $\$40 \div 5 = \$8.00; \$8.00 + 7 = \$1.14\frac{2}{3}; \$1.14\frac{2}{3} \times 137 = \$156.57\frac{1}{3} \text{ Ans.}$
31.  $\$360 \div 20 = \$18; \$18 \div 6 = \$3; \$3 \times 263 = \$789 \text{ Ans.}$
32.  $\$8.75 \div 7 = \$1.25; \$1.25 \div 11 = \$0.11\frac{4}{11}; \$0.11\frac{4}{11} \times 205 = \$23.29\frac{4}{11} \text{ Ans.}$
33.  $\$19.80 \div 3 = \$6.60; \$6.60 \div 7 = \$0.94\frac{2}{7}; \$0.94\frac{2}{7} \times 81 = \$76.37\frac{1}{7} \text{ Ans.}$
35.  $3\text{cwt.} \div 151 = \frac{3}{151}; \frac{3}{151} \times \frac{2}{1} = \frac{2}{151}; \frac{2}{151} \times \frac{1}{1} = \frac{1}{151} = 12\frac{80}{151} \text{ cwt. Ans.}$
36.  $\$276.18 \div 24 = \$11.50\frac{3}{4}; \$11.50\frac{3}{4} \times 7 = \$80.55\frac{1}{4}; \$80.55\frac{1}{4} \times 75 = \$6041.43\frac{3}{4} \text{ Ans.}$
37.  $\$875.00 \div 81 = \$10.80\frac{20}{81}; \$10.80\frac{20}{81} \times 11 = \$118.82\frac{20}{81}; \$118.82\frac{20}{81} \times 75 = \$8912.03\frac{10}{27} \text{ Ans.}$
38.  $\$70 \div 35 = \$2; \$2 \times 8 = \$16; \$16 \times 86 = \$1376 \text{ Ans.}$
39.  $\$375.00 \div 111 = \$3.37\frac{22}{111}; \$3.37\frac{22}{111} \times 4 = \$13.51\frac{32}{111}; \$13.51\frac{32}{111} \times 69 = \$932.43\frac{2}{37} \text{ Ans.}$
40.  $\$80.50 \div 23 = \$3.50; \$3.50 \times 5 = \$17.50; \$17.50 \times 15 = \$262.50 \text{ Ans.}$
41.  $\$62.37 \div 81 = \$0.77; \$0.77 \times 11 = \$8.47; \$8.47 \times 19 = \$160.93 \text{ Ans.}$
43.  $\$668.50 \div 191 = \$3.50; \$3.50 \times 11 = \$38.50; \$38.50 \div 5 = \$7.70; \$7.70 \times 449 = \$3457.30 \text{ Ans.}$
44.  $\$1738 \div 79 = \$22; \$22 \times 4 = \$88; \$88 \div 11 = \$8; \$8 \times 411 = \$3288 \text{ Ans.}$
45.  $1128\text{ft.} \div 47 = 24; 24 \times 4 = 96; 96 \div 8 = 12; 8 \times 1435 = 11480 \text{ feet, Ans.}$
46.  $116\text{cwt.} \div 29 = 4; 4 \times 8 = 32; 32 \div 4 = 8; 8 \times 47 = 376\text{cwt. Ans.}$
47.  $376 \div 47 = 8; 8 \times 4 = 32; 32 \div 8 = 4; 4 \times 29 = 116\text{cwt. Ans.}$



48.  $\$8 \div 10 = \frac{4}{5}$ ;  $\frac{4}{5} \times 7 = \frac{28}{5}$ ;  $\frac{28}{5} \times \frac{1}{4} = \frac{7}{5}$ ;  $\frac{7}{5} \times \frac{35}{1} =$   
 $\$49$  Ans.
49.  $\$414 \div 207 = \$2$ ;  $\$2 \times 10 = \$20$ ;  $\$20 \div 5 = \$4$ ;  
 $\$4 \times 59 = \$236$  Ans.

## MISCELLANEOUS QUESTIONS BY ANALYSIS.

1. (p. 179.)  $\$896.50 \div 11 = \$81.50$ ;  $\$81.50 \times 10 =$   
 $\$815$  Ans.
2.  $\$17\frac{3}{11} \div 3 = \$5\frac{3}{11}$ ;  $\$5\frac{3}{11} \times 37 = \$213.03\frac{3}{11}$  Ans.
3.  $\$3687 \div 8 = \$460.87\frac{1}{2}$ ;  $\$460.87\frac{1}{2} \times 7 = \$3226.12\frac{1}{2}$  Ans.
4.  $17\frac{7}{12} = 21\frac{1}{12}$ ;  $187\frac{3}{8} = 149\frac{3}{8}$ ;  $149\frac{3}{8} \div 21\frac{1}{12} = \frac{1499}{8} \times$   
 $\frac{3}{2} = \frac{172}{211} = \frac{4487}{4222}$ ;  $\frac{4487}{4222} \times \frac{1}{7} = \frac{22435}{25554} = \$7.61\frac{253}{1477}$  Ans.
5.  $\$13\frac{7}{8} = 1\frac{1}{8}$ ;  $1\frac{1}{8} \times \frac{1}{15} = 1\frac{21}{120} = \$30.52\frac{1}{2}$  Ans.
6.  $\$37\frac{3}{11} = \frac{410}{11}$ ;  $\frac{410}{11} \div 100 = \frac{41}{110}$ ;  $\frac{41}{110} \times \frac{1}{4} = \frac{41}{440} =$   
 $\$0.21\frac{1}{44}$  Ans.
7.  $\$0.12 \times \frac{1}{4} = \frac{12}{400}$ ;  $48\frac{7}{8} = \frac{631}{13}$ ;  $\frac{12}{400} \times \frac{631}{13} = \frac{20823}{13000} =$   
 $\$16.01\frac{1}{130}$  Ans.
8.  $\$3\frac{7}{8} = \frac{23}{8}$ ;  $6\frac{3}{5} = \frac{33}{5}$ ;  $\frac{23}{8} \times \frac{33}{5} = \frac{207}{20}$ ;  $\frac{207}{20} \times \frac{23}{5} = \frac{6831}{100} =$   
 $\$68\frac{31}{100}$  Ans.
9.  $\$236 \div 11\frac{1}{2} = \frac{236}{11\frac{1}{2}} \times \frac{2}{2} = \frac{472}{23} = \$20$ ;  $\$20 \times 20\frac{7}{10} = \$414$   
 [Ans.]
10.  $97\frac{1}{4} \div 3 = 32\frac{1}{4}$ ;  $1073\frac{3}{4} \div 32\frac{1}{4} = \frac{7513}{7} \times \frac{3}{688} = 33$   
 bales, Ans.
11.  $\$48\frac{11}{10} \div 6\frac{3}{5} = \frac{6831}{140} \div \frac{33}{5} = \frac{6831}{140} \times \frac{5}{33} = \frac{207}{28} = 207$ ;  
 $\frac{207}{28} \times \frac{4}{9} = \frac{23}{7} = \$3.28\frac{1}{7}$  Ans.

$$12. 34 \div 3\frac{2}{3} = \frac{34}{1} \times \frac{3}{11} = \frac{102}{11}; \frac{102}{11} \times 74\frac{1}{2} = \frac{102}{11} \times \frac{149}{2} = 711\frac{2}{11} = \$6.90\frac{2}{11} \text{ Ans.}$$

$$13. \$63 \div 2\frac{1}{2} = 63 \div \frac{1}{2} = \frac{63}{1} \times \frac{2}{1} = 126; \frac{126}{19} \times \frac{148}{9} = 126\frac{2}{19} = \$381\frac{2}{19} \text{ Ans.}$$

$$14. \$17\frac{1}{11} \div (3 \times 3) = \$17\frac{1}{11} \div 9 = \$1\frac{8}{99}; \$1\frac{8}{99} \times 4 = \$7\frac{8}{99} \text{ Ans.}$$

$$15. \$31\frac{1}{2} = 22\frac{1}{2}; 2\frac{1}{2} = \frac{1}{2}; 22\frac{1}{2} \div \frac{1}{2} = \frac{22\frac{1}{2}}{1} \times \frac{2}{1} = 45; 45 \times \frac{6}{17} = 15\frac{6}{17};$$

$$689\frac{4}{13} = 22\frac{6}{13}; \frac{22\frac{6}{13}}{7} \times \frac{8961}{13} = 227\frac{6}{13} = \$7680\frac{6}{13} \text{ Ans.}$$

$$16. \$63 \div 6\frac{2}{3} = \frac{63}{1} \div \frac{2}{3} = \frac{63}{1} \times \frac{3}{2} = 94\frac{1}{2}; \frac{94\frac{1}{2}}{20} \times \frac{18}{1} = 17\frac{9}{10} = \$170.10 \text{ Ans.}$$

$$17. \$243\frac{1}{11} = 22\frac{1}{11}; 2\frac{1}{11} \div 2\frac{1}{11} = \frac{22\frac{1}{11}}{1} \times \frac{11}{1} = 23; 23 \times \frac{11}{1337} = 1\frac{528}{1337};$$

$$\$1000 \times 1\frac{528}{1337} = 3941\frac{222}{1337} \text{ barrels, Ans.}$$

$$18. 83\frac{2}{5} = 16\frac{2}{5}; \$7888.30 \div 16\frac{2}{5} = \frac{7888.30}{1} \times \frac{5}{13} = \$94.40; \$94.40 \times 7 = \$660.80 \text{ Ans.}$$

$$19. 132\text{£}. 12\text{s.} = 2652\text{s.}; 7\frac{1}{2} = \frac{15}{2}; 12\frac{1}{2} = \frac{25}{2}; 2652\text{s.} \div$$

$$\frac{15}{2} = \frac{2652}{1} \times \frac{2}{15} = 353\text{s.}; \frac{353}{1} \times \frac{115}{9} = 4485\text{s.} = 224\text{£}. 5\text{s.} \text{ Ans.}$$

$$20. 17\frac{2}{3} = \frac{52}{3}; 89\frac{1}{3} = 26\frac{2}{3}; \$25.44 \div 26\frac{2}{3} = \frac{2544}{1} \times \frac{3}{8} =$$

$$\$144; \frac{144}{1} \times \frac{268}{3} = \$128.64 \text{ Ans.}$$

$$21. 7\frac{1}{2} = \frac{15}{2}; 19\frac{1}{2} = \frac{39}{2}; \$7.28 \div \frac{15}{2} = \frac{728}{1} \times \frac{12}{91} =$$

$$\$0.96; \$0.96 \times \frac{39}{2} = \$19.12 \text{ Ans.}$$

$$22. 49\frac{1}{2} = \frac{99}{2}; 37\frac{1}{2} = \frac{75}{2}; \$4355.52 \div \frac{99}{2} = \frac{435552}{1} \times$$

$$\frac{2}{1248} = \$87.36; \frac{75}{1} \times \frac{264}{7} = \$3294.72 \text{ Ans.}$$

$$23. \frac{1}{4} \times \frac{3}{5} = \frac{3}{20}; \$300,000 \div 3 = \$100,000; \$100,000 \times$$

$$20 = \$2,000,000 \text{ Ans.}$$

$$24. 7\frac{1}{3} = \frac{22}{3}; 19\frac{1}{4} = \frac{77}{4}; \$135.80 \div \frac{22}{3} = \frac{140}{1} \times \frac{13}{97} =$$

$$\$18.20; \frac{13580}{1} \times \frac{79}{4} = \$359.45 \text{ Ans.}$$

$$25. 6 \text{ cords } 76 \text{ ft.} = 844 \text{ ft.}; \frac{7}{8} - \frac{3}{8} = \frac{4}{8}; 4\frac{1}{2} = \frac{9}{2}; 844 \text{ ft.} \times \frac{4}{8}$$

$$= 422 \times \frac{4}{8} = 211; 211 \times \frac{9}{2} = 949.5 = \$23.14\frac{1}{2}$$

$$\text{Ans.}$$

$$26. 30 \text{ rd.} \times 30 \text{ rd.} = 900; 18 + 82 = 100; 900 - 100 = 800;$$

$$\frac{800}{800} = \frac{1}{1} \text{ Ans.}$$

$$27. 7 \text{ T. } 12 \text{ cwt. } 3 \text{ qr. } 18 \text{ lb.} - 3 \text{ T. } 18 \text{ cwt. } 1 \text{ qr. } 20 \text{ lb.} = 3 \text{ T. } 14 \text{ cwt.}$$

$$1 \text{ qr. } 26 \text{ lb.} = 8342 \text{ lb.}; 8342 \times \frac{2}{5} = 2692.8; 5\frac{1}{2} = \frac{11}{2};$$

$$2692.8 \times \frac{11}{2} = 29620.8 = \$271.71\frac{3}{5} \text{ Ans.}$$

$$28. \$68.50 \times 37 = \$2534.50; \$2534.50 \times \frac{3}{4} = \$1900.87\frac{1}{2}$$

$$= \text{value of coffee}; \$2534.50 - \$1900.87\frac{1}{2} = \$633.62\frac{1}{2}$$

$$\text{Ans.}$$

$$29. \frac{1}{4} - \frac{3}{4} = \frac{2}{4}; \$7896 \times \frac{1}{4} = \$1974; \$1974 \times 2 = \$3948$$

$$\text{Ans.}$$

$$30. \frac{1}{3} - \frac{1}{3} = \frac{0}{3}; \frac{2}{3} \times \frac{5}{3} = \frac{10}{9}; \frac{2}{3} - \frac{10}{9} = \frac{2}{9}; \$88$$

$$\times \frac{2}{9} = \frac{176}{9} \times \frac{72}{189} = \frac{12832}{189} = \$37.49\frac{12}{189} \text{ Ans.}$$

$$31. \frac{1}{4} - \frac{3}{4} = \frac{2}{4}; \frac{1}{4} \times \frac{2}{3} = \frac{1}{6}; \frac{1}{4} - \frac{1}{6} = \frac{1}{12}; \frac{1}{12} \times \frac{3}{4} = \frac{1}{16} =$$

$$\$750; \frac{1}{16} = \$750 \times 16 = \$12,000 \text{ Ans.}$$

# DECIMAL FRACTIONS.

## NOTATION OF DECIMAL FRACTIONS.

| (ART. 181, p. 183.) |          | 7.                  | 75.9           |
|---------------------|----------|---------------------|----------------|
| 1.                  | 307.25   | 8.                  | 2000.002       |
| 2.                  | 47.7     | 9.                  | 18.018         |
| 3.                  | 18.05    | 10.                 | 505.001006     |
| 4.                  | 29.003   | 11.                 | 300.0000042    |
| 5.                  | .0049    | 12.                 | 2500.000000037 |
| 6.                  | 8.000008 | or 2500.00000000037 |                |

## ADDITION OF DECIMALS.

### (ART. 183, p. 184.)

| (2.)              | (3.)         | (4.)               |
|-------------------|--------------|--------------------|
| 171.61111         | .16711       | 151.01             |
| 16.7101           | 1.766        | 611111.01          |
| .00007            | 76111.1      | 16.5               |
| 71.0006           | 167.1        | 6.7                |
| 1.167895          | .000007      | 46.1               |
| <u>260.489775</u> | 1476.1       | <u>.67896</u>      |
|                   | 77756.233117 | 611331.99896       |
|                   |              |                    |
| (5.)              | (6.)         | (7.)               |
| 56000.014         | 49.0105      | 3.0018             |
| 19.19             | 89.107       | 1005.023043        |
| 57.0048           | .000127      | 87.107             |
| 23005.4           | .0048        | .0049              |
| <u>.000014</u>    | 138.122427   | <u>47000.00309</u> |
| 79081.608614      |              | 48095.139833       |

## SUBTRACTION OF DECIMALS.

### (ART. 184, p. 185.)

| (5.)             | (6.)           | (7.)           | (8.)           | (9.)          |
|------------------|----------------|----------------|----------------|---------------|
| 81.35            | 1.             | 100.           | 87.1           | 100.          |
| 11.678956        | .876543        | 99.111176      | 5.6789         | .001          |
| <u>69.671044</u> | <u>.123457</u> | <u>.888824</u> | <u>81.4211</u> | <u>99.999</u> |

70

## KEY TO

| (10.)         | (11.)           | (12.)                 | (13.)        | (14.)        |
|---------------|-----------------|-----------------------|--------------|--------------|
| 73.           | 365.            | 357000.               | .875         | .3125        |
| .073          | .0047           | 28.0004009            | .4           | .125         |
| <u>72.927</u> | <u>364.9953</u> | <u>356971.9995991</u> | <u>.475</u>  | <u>.1875</u> |
| (15.)         | (16.)           | (17.)                 | (18.)        | (19.)        |
| .95           | 3.7             | 8.125                 | 9.375        | .666         |
| .44           | 1.8             | 2.6875                | 1.5          | .041         |
| <u>.51</u>    | <u>1.9</u>      | <u>5.4375</u>         | <u>7.875</u> | <u>.625</u>  |

## MULTIPLICATION OF DECIMALS.

|                     |           |    |           |
|---------------------|-----------|----|-----------|
| (ART. 185, p. 187.) |           | 6. | 1137.     |
| 3.                  | .12649    | 7. | 2.20947   |
| 4.                  | 18.58922  | 8. | .00046967 |
| 5.                  | .00000114 | 9. | 22.09     |

| (10.)             | (11.)                | (12.)      | (13.)            |
|-------------------|----------------------|------------|------------------|
| .087              | 107000.0015          | .0097      | .096             |
| .000015           | .0107                | 400.67     | .00096           |
| <u>.000001905</u> | <u>7490000105</u>    | <u>679</u> | <u>576</u>       |
|                   | 1070000015           | 582        | 864              |
|                   | <u>1144.90001605</u> | <u>388</u> | <u>.00009216</u> |
|                   |                      | 3.886499   |                  |

| (14.)     | (15.)      | (16.)      | (17.)              |
|-----------|------------|------------|--------------------|
| 1000000.  | 100.       | .101       | 1050.0007          |
| .000001   | .0014      | .10101     | .00305             |
| <u>1.</u> | <u>400</u> | <u>101</u> | <u>52500035</u>    |
|           | 100        | 101        | 31500021           |
|           | <u>.14</u> | <u>101</u> | <u>3.202502135</u> |
|           |            | .01020201  |                    |

| (18.)           | (19.)              | (20.)           |
|-----------------|--------------------|-----------------|
| 2000000.        | 400.004            | \$ 1.125        |
| .7              | 30.03              | 46.             |
| <u>1400000.</u> | <u>1200012</u>     | <u>6750</u>     |
|                 | 1200012            | 4500            |
|                 | <u>12012.12012</u> | <u>\$ 51.75</u> |

| (21.)         | (22.)    | (23.)       |
|---------------|----------|-------------|
| Tons 17.125   | \$ .125  | 375.25      |
| \$ 18.875     | 18.      | \$ 0.62     |
| 85625         | 1000     | 75050       |
| 119875        | 125      | 225150      |
| 137000        | \$ 2.250 | \$ 232.6550 |
| 137000        |          |             |
| 17125         |          |             |
| \$ 323.234375 |          |             |

DIVISION OF DECIMALS.

|                             |                             |                      |
|-----------------------------|-----------------------------|----------------------|
| 3. (ART. 186, p. 189.) .375 | 7.                          | .0144                |
| 4. 2.069                    | 8.                          | 9.784                |
| 5. 1930.51                  | 9.                          | 125.36               |
| 6. .069255                  | 10.                         | 148.939 +            |
| (11.)                       | (12.)                       | (13.)                |
| 1.2)172.8(144.              | .12)1728(14400.             | .12)1728(1.44        |
| (14.)                       | (15.)                       | (16.)                |
| 12)1.728(.144               | 1.2)17.28(14.4              | .0012)1728(1440000.  |
| (17.)                       | (18.)                       | (19.)                |
| 12).001728(.000144          | 9.7)147.828(15.24           | .328).678767(2.069 + |
| (20.)                       | (21.)                       |                      |
| 5.428)75.16(13.846 +        | 31.076)4.01020304(.129045 + |                      |

REDUCTION OF DECIMALS.

(ART. 187, p. 190.)

|             |             |             |
|-------------|-------------|-------------|
| (2.)        | (3.)        | (4.)        |
| 4)3.00      | 8)7.000     | 16)7.0000   |
| .75         | .875        | .4375       |
| (5.)        | (6.)        | (7.)        |
| 11)4.000000 | 12)5.000000 | 17)4.000000 |
| .363636 +   | .416666 +   | .235294 +   |

(ART. 188, p. 191.)

$$\begin{array}{r} \text{(2.)} \\ 12 \overline{) 6.0} \\ 20 \overline{) 15.5} \\ \hline .775 \end{array}$$

$$\begin{array}{r} \text{(3.)} \\ 28 \overline{) 14.0} \\ 4 \overline{) 2.500} \\ 20 \overline{) 5.6250} \\ \hline .28125 \end{array}$$

$$\begin{array}{r} \text{(4.)} \\ 28 \overline{) 21.00} \\ 4 \overline{) 3.7500} \\ \hline .9375 \end{array}$$

$$\begin{array}{r} \text{(5.)} \\ 40 \overline{) 8.0} \\ 8 \overline{) 6.200} \\ \hline .775 \end{array}$$

$$\begin{array}{r} \text{(6.)} \\ 144 \overline{) 72.0} \\ 272 \overline{) 167.5} \\ 40 \overline{) 19.615243} \\ 4 \overline{) 3.490381} \\ \hline .872595 + \end{array}$$

(ART. 189, p. 192.)

$$\begin{array}{r} \text{(1.)} \\ .628125 \\ 20 \\ \hline 12.562500 \\ 12 \\ \hline 6.750000 \\ 4 \\ \hline 3.000000 \end{array}$$

Ans. 12s. 6 $\frac{1}{2}$ d.

$$\begin{array}{r} \text{(2.)} \\ .778125 \\ 20 \\ \hline 15.562500 \\ 4 \\ \hline 2.250000 \\ 28 \\ \hline 7.000000 \end{array}$$

Ans. 15cwt. 2qr. 7lb.

$$\begin{array}{r} \text{(3.)} \\ .75 \\ 5 \\ \hline 3.75 \\ 4 \\ \hline 3.00 \end{array}$$

Ans. 3qr. 3pa.

$$\begin{array}{r} \text{(4.)} \\ .965625 \\ 8 \\ \hline 7.725000 \\ 40 \\ \hline 29.000000 \end{array}$$

Ans. 7fur. 29rd.

$$\begin{array}{r} \text{(5.)} \\ .94375 \\ 4 \\ \hline 3.77500 \\ 40 \\ \hline 31.00000 \end{array}$$

Ans. 3R. 31p.

$$\begin{array}{r} \text{(6.)} \\ .815625 \\ 12 \\ \hline 9.787500 \\ 20 \\ \hline 15.750000 \\ 24 \\ \hline 18.000000 \end{array}$$

Ans. 9oz. 15dwt. 18gr.

$$\begin{array}{r} \text{(7.)} \\ .5555 \\ 12 \\ \hline 6.6660 \\ 8 \\ \hline 5.3280 \\ 3 \\ \hline .9840 \\ 20 \\ \hline 19.6800 \end{array}$$

Ans. 6 $\frac{1}{2}$  53 09 19 $\frac{1}{4}$ gr.

## EXERCISES IN DECIMALS.

$$\begin{array}{r}
 (1.) \\
 28 \overline{) 14.0} \\
 4 \overline{) 3.500} \\
 \underline{15.875} \\
 \$ 9.50 \\
 793750 \\
 \underline{142875} \\
 \$ 150.81,250
 \end{array}$$

$$\begin{array}{r}
 (2.) \\
 28 \overline{) 7.00} \\
 4 \overline{) 1.2500} \\
 20 \overline{) 18.3125} \\
 \underline{17.915625} \\
 \$ 53.80 \\
 1433250000 \\
 53746875 \\
 \underline{89578125} \\
 \$ 963.86,0625
 \end{array}$$

3.  $16 \div 40 = .4$ ;  $3 + .4 = 3.4$ ;  $3.4 \div 4 = .85$ ;  $37 + .85 = 37.85$ ;  $37.85 \times \$ 75.16 = \$ 2844.80,6$  Ans.
4.  $2 \div 4 = .5$ ;  $3 + .5 = 3.5$ ;  $3.5 \div 4 = .875$ ;  $15 + .875 = 15.875$ ;  $15.875 \times \$ 3.75 = \$ 59.53,125$  Ans.
5.  $15.375 \times \$ 4.62,5 = \$ 71.10,9375$  Ans.
6.  $36 \div 40 = .9$ ;  $6 + .9 = 6.9$ ;  $6.9 \div 8 = .8625$ ;  $17 + .8625 = 17.8625$ ;  $17.8625 \times \$ 3765.60 = \$ 67263.03$  Ans.
7.  $21 \div 63 = .333 +$ ;  $27 + .333 + = 27.333 +$ ;  $27.333 + \times \$ 15.375 = \$ 420.24,4875 +$  Ans.
8.  $9 \div 12 = .75$ ;  $18 + .75 = 18.75$ ;  $6 + 12 = .5$ ;  $4 + .5 = 4.5$ ;  $3 \div 12 = .25$ ;  $7 + .25 = 7.25$ ;  $18.75 \times 4.5 \times 7.25 = 611.71875$  feet;  $.71875 \times 1728 = 1242$  inches. Ans. 611ft. 1242in.
9.  $6 \div 12 = .5$ ;  $12 + .5 = 12.5$ ;  $9 \div 12 = .75$ ;  $2 + .75 = 2.75$ ;  $12.5 \times 2.75 = 34.375$  feet;  $.375 \times 144 = 54$  inches. Ans. 34ft. 54in.
10.  $1 \div 2 = .5$ ;  $3 + .5 = 3.5$ ;  $3.5 \div 4 = .875$ ;  $25 + .875 = 25.875$ ;  $25.875 \times \$ .375 = \$ 9.70,3125$  Ans.
11.  $30 \div 40 = .75$ ;  $3 + .75 = 3.75$ ;  $3.75 \div 4 = .9375$ ;  $144 + .9375 = 144.9375$ ;  $144.9375 \times \$ 97.625 = \$ 14149.52,34375$  Ans.
12.  $21 \div 28 = .75$ ;  $.75 \div 4 = .1875$ ;  $18 + .1875 = 18.1875$ ;  $18.1875 \div 20 = .909375$ ;  $3 + .909375 =$



- 3.909375 ;  $3.909375 \times \$ 9.375 = \$ 36.65,0390625$  ;  
 $\$ 36.65,0390625 - \$ 20.25 = \$ 16.40 +$  Ans.  
 13.  $\$ 5.50 \div 7 = \$ .78\frac{1}{2}$  ;  $\$ .78\frac{1}{2} \times 8 = \$ 6.28\frac{1}{2}$  ;  $\$ 6.28\frac{1}{2} \times$   
 $7.75 = \$ 48.71,42\frac{1}{2}$  Ans.  
 14.  $\$ 12\frac{1}{2} = \$ 12.625$  ;  $4\frac{1}{2} = 4.75$  ;  $\$ 12.625 \div 4.75 =$   
 $2.657894 +$  ;  $2.657894 + \times 17.375 = \$ 46.18,09 +$  Ans.

## REDUCTION OF CURRENCIES.

2. (ART. 191, p. 194.)  $144\text{£. } 7\text{s. } 6\text{d.} = 144.375\text{£.}$  ;  
 $144.375\text{£.} \div \frac{1}{10}\text{£.} = \$ 481.25$  Ans. [Ans.  
 3.  $74\text{£. } 1\text{s. } 6\text{d.} = 74.075\text{£.}$  ;  $74.075\text{£.} \div \frac{1}{2}\text{£.} = \$ 185.18\frac{1}{2}$  ,  
 4.  $129\text{£.} \div \frac{3}{8}\text{£.} = \$ 344$  Ans.  
 5.  $144\text{£. } 6\text{s. } 3\text{d. } 2\text{qr.} = 144.31458 + \text{£.}$  ;  $144.31458 + \text{£.} \div$   
 $\frac{1}{2}\text{£.} = \$ 288.62,9$  Ans.  
 6.  $84\text{£.} \div \frac{7}{10}\text{£.} = \$ 360$  Ans.  
 7.  $144\text{£. } 4\text{s.} = 144.20\text{£.}$  ;  $144.20\text{£.} \div \frac{1}{4}\text{£.} = \$ 576.80$ , Ans.  
 8.  $257\text{£. } 8\text{s. } 6\text{d.} = 257.425\text{£.}$  ;  $257.425\text{£.} \div \frac{1}{121}\text{£.} =$   
 $\$ 1245.93,7$  Ans.  
 2. (ART. 192, p. 195.)  $\$ 481.25 \times \frac{1}{10} = 144.375\text{£.} =$   
 $144\text{£. } 7\text{s. } 6\text{d.}$  Ans.  
 3.  $\$ 185.18\frac{1}{2} \times \frac{1}{2} = 74.075\text{£.} = 74\text{£. } 1\text{s. } 6\text{d.}$  Ans.  
 4.  $\$ 344 \times \frac{3}{8} = 129\text{£.}$  Ans.  
 5.  $\$ 288 \times \frac{1}{2} = 144\text{£.}$  Ans.  
 6.  $\$ 360 \times \frac{7}{10} = 84\text{£.}$  Ans.  
 7.  $\$ 576.50 \times \frac{1}{4} = 144.125\text{£.} = 144\text{£. } 2\text{s. } 6\text{d.}$  Ans.  
 8.  $\$ 1245.93,7 \times \frac{1}{121} = 257.425\text{£.} = 257\text{£. } 8\text{s. } 6\text{d.}$  Ans.

## PERCENTAGE.

- |                        |              |    |              |
|------------------------|--------------|----|--------------|
| 2. (ART. 194, p. 197.) | $\$ 6.50$    | 5. | 57.375 tons. |
| 3.                     | $\$ 39.45$   | 6. | $\$ 490$     |
| 4.                     | $\$ 51.38,9$ | 7. | $\$ 15.12$   |

8. 26.415 yards. | 10. 29.44 yards.  
 9. \$ 877.50 | 11. \$ 8500  
 12. \$ 100  $\times$  25 = \$ 2500 ; \$ 2500  $\times$  .12 = \$ 300 Ans.  
 13. \$ 25  $\times$  1728 = \$ 43200 ; \$ 43200  $\times$  .15 = \$ 6480 Ans.  
 14. 5000  $\times$  \$ 1.25 = \$ 6250 ; \$ 5000  $\times$  .25 = 1250 ; 5000 —  
 1250 = 3750 ; 3750  $\times$  \$ 2 = \$ 7500 ; \$ 7500 —  
 \$ 6250 = \$ 1250 Ans.  
 15. \$ 8000  $\times$  .19 = \$ 1520 ; \$ 8000 — \$ 1520 = \$ 6480 ;  
 \$ 6480  $\times$  .37 = \$ 2397.60 ; \$ 6480.00 — \$ 2397.60 =  
 \$ 4082.40 ; \$ 4082.40 — \$ 2000 = \$ 2082.40 Ans.  
 16. \$ 100  $\times$  .15 = \$ 15 ; \$ 100 — \$ 15 = \$ 85 ; \$ 85  $\times$  17  
 = \$ 1445 ; \$ 100 + \$ 15 = \$ 115 ; \$ 115  $\times$  17 =  
 \$ 1955 ; \$ 1955 — \$ 1445 = \$ 510 Ans.

(17.)

$$1\frac{1}{2} = 1.75$$

$$1.75 \times .95 = 1.6625$$

$$10 \div 1.6625 = 6\frac{2}{3} = 6\frac{2}{3}$$

$$6\frac{2}{3} \times 1\frac{1}{2} = 10\frac{1}{3}$$

$$12635)80000(6\text{yd.}$$

$$\underline{75810}$$

$$4190$$

$$\underline{4}$$

$$12635)16760(1\text{qr.}$$

$$\underline{12635}$$

$$4125$$

$$\underline{4}$$

$$12635)16500(1\frac{1}{2}\frac{1}{2}\frac{1}{2}\text{na.}$$

$$\underline{12635}$$

$$3865$$

$$\text{Ans. 6yd. 1qr. } 1\frac{1}{2}\frac{1}{2}\frac{1}{2}\text{na.}$$

### SIMPLE INTEREST.

(ART. 197, p. 200.)

|    |                         |     |                         |
|----|-------------------------|-----|-------------------------|
| 2. | \$ 0.08,1               | 8.  | \$ 0.25,0 $\frac{1}{2}$ |
| 3. | \$ 0.10,7               | 9.  | \$ 0.02,0 $\frac{1}{2}$ |
| 4. | \$ 0.22,3 $\frac{1}{2}$ | 10. | \$ 1.02,0 $\frac{1}{2}$ |
| 5. | \$ 0.12,8 $\frac{1}{2}$ | 11. | \$ 1.31,9 $\frac{1}{2}$ |
| 6. | \$ 0.42,2 $\frac{1}{2}$ | 12. | \$ 1.20,0 $\frac{1}{2}$ |
| 7. | \$ 0.01,9 $\frac{1}{2}$ | 13. | \$ 2.11,5 $\frac{1}{2}$ |

| (ART. 198, p. 201.) |              | 13. | \$ 1.24,8    |
|---------------------|--------------|-----|--------------|
| 2.                  | \$ 11.82     | 14. | \$ 0.20,5    |
| 3.                  | \$ 311.04    | 15. | \$ 50.01,6   |
| 4.                  | \$ 8.28      | 16. | \$ 0.03,1    |
| 5.                  | \$ 155.52    | 17. | \$ 55.60,7   |
| 6.                  | \$ 1.68,7    | 18. | \$ 149.77,6  |
| 7.                  | \$ 17.72,2   | 19. | \$ 7.20,5    |
| 8.                  | \$ 8.25,8    | 20. | \$ 1.05,7    |
| 9.                  | \$ 90.83,5   | 21. | \$ 8.79,7    |
| 10.                 | \$ 1110.23,4 | 22. | \$ 7.23      |
| 11.                 | \$ 88.39,9   | 23. | \$ 1661.37,6 |
| 12.                 | \$ 122.71,5  |     |              |

| 1. (ART. 199, p. 203.) \$10.08 |             | 9.  | \$ 14.15,1 |
|--------------------------------|-------------|-----|------------|
| 2.                             | \$ 97.18    | 10. | \$ 33.97,9 |
| 3.                             | \$ 231.29,9 | 11. | \$ 16.45,0 |
| 4.                             | \$ 78.41,4  | 12. | \$ 13.91   |
| 5.                             | \$ 446.92,9 | 13. | \$ 209.82  |
| 6.                             | \$ 0.84,9   | 14. | \$ 1183.18 |
| 7.                             | \$ 430.36   | 15. | \$ 21.03,7 |
| 8.                             | \$ 137.92,2 | 16. | \$ 388.94  |

| (ART. 200, p. 204.) |            | 7.  | \$ 2163.19,9 |
|---------------------|------------|-----|--------------|
| 2.                  | \$ 745.50  | 8.  | \$ 274.77,5  |
| 3.                  | \$ 207.27  | 9.  | \$ 131.99    |
| 4.                  | \$ 19.71,3 | 10. | \$ 253.11,9  |
| 5.                  | \$ 61.75,4 | 11. | \$ 95.02,8   |
| 6.                  | \$ 1.86,8  | 12. | \$ 1904.12,1 |

(2.) (ART. 201, p. 205.)

26£. 10s. = 26.50£.

Interest of 1£. = .14

|          |
|----------|
| 10600    |
| 2650     |
| 6)3.7100 |
| 6183½    |
| 3.0916½  |

(Carried up.)

(Brought up.)

|         |
|---------|
| 3.0916½ |
| 20      |
| 1.8333½ |
| 12      |
| 10.0000 |

3£. 1s. 10d. Ans.

| (3.)                    |  | (4.)                     |        |
|-------------------------|--|--------------------------|--------|
| 42£. 18s. = 42.90£.     |  | 94£. 12s. 6d. = 94.625£. |        |
| Interest of 1£. = .109½ |  | Interest of 1£. = .271½  |        |
| 38610                   |  | 94625                    |        |
| 4290                    |  | 662375                   |        |
| 715                     |  | 189250                   |        |
| 4.68325                 |  | 15770                    |        |
| 20                      |  | 25.659145                | 2 = ½) |
| 13.66500                |  | 8.553048                 |        |
| 12                      |  | 34.212193                |        |
| 7.98                    |  | 20                       |        |
| 4                       |  | 4.243860                 |        |
| 3.92                    |  | 12                       |        |
| 4£. 13s. 7½d. Ans.      |  | 2.92632                  |        |
|                         |  | 4                        |        |
|                         |  | 3.70528                  |        |
|                         |  | 34£. 4s. 2½d. Ans.       |        |

| (5.)                      |  | (Brought up.)         |  |
|---------------------------|--|-----------------------|--|
| 110£. 7s. 6d. = 110.375£. |  | Interest = 38.171352½ |  |
| Interest of 1£. = .415    |  | 110.375               |  |
| 551875                    |  | Amount = 148.546      |  |
| 110375                    |  | 20                    |  |
| 441500                    |  | 10.920                |  |
| 6)45.805623               |  | 12                    |  |
| 7.634270½                 |  | 11.040                |  |
| Interest = 38.171352½     |  |                       |  |
| (Carried up.)             |  | 148£. 10s. 11d. Ans.  |  |

## MISCELLANEOUS EXERCISES IN INTEREST.

(PAGE 206.)

NOTE. When the required interest is more or less than 6 per cent., we may first find the interest at 6 per cent. by the foregoing Rules, then divide this interest by 6, and the quotient will be the interest of the required sum at 1 per cent. Then, if we multiply the 1 per cent. by the required per cent. we obtain the answer. Or the pupil, if he please, can perform the following questions by Article 200.

## KEY TO

| (1.)  |     |    |
|-------|-----|----|
| y.    | mo. | d. |
| 1842  | 6   | 9  |
| 1840  | 8   | 25 |
| <hr/> |     |    |
| 1     | 9   | 14 |

\$ 172.50  
 .107 $\frac{1}{2}$   
120750  
 17250  
 5750  
\$ 18.51,500

| (4.)  |     |    |
|-------|-----|----|
| y.    | mo. | d. |
| 1841  | 11  | 11 |
| 1839  | 3   | 7  |
| <hr/> |     |    |
| 2     | 8   | 4  |

\$ 67.07  
 .160 $\frac{3}{4}$   
402420  
 6707  
 4471  
\$ 10.77,591

| (7.)  |     |    |
|-------|-----|----|
| y.    | mo. | d. |
| 1842  | 1   | 11 |
| 1841  | 2   | 1  |
| <hr/> |     |    |
| 11    | 10  |    |

\$ 7.18  
 .056 $\frac{3}{4}$   
4308  
 3590  
 478  
\$ 40,686

| (2.)  |     |    |
|-------|-----|----|
| y.    | mo. | d. |
| 1841  | 4   | 5  |
| 1838  | 11  | 10 |
| <hr/> |     |    |
| 2     | 4   | 25 |

169.75  
 .144 $\frac{1}{2}$   
67900  
 67900  
 16975  
 2829  
\$ 24.47,229

| (5.)  |     |    |
|-------|-----|----|
| y.    | mo. | d. |
| 1841  | 11  | 19 |
| 1839  | 0   | 7  |
| <hr/> |     |    |
| 2     | 11  | 12 |

\$ 117.75  
 .177  
82425  
 82425  
 11775  
\$ 20.84,175

| (8.)  |     |    |
|-------|-----|----|
| y.    | mo. | d. |
| 1845  | 10  | 25 |
| 1842  | 4   | 29 |
| <hr/> |     |    |
| 3     | 5   | 26 |

\$ 976.18  
 .209 $\frac{1}{2}$   
878562  
 195236  
 32539  
\$ 204.34,701

| (3.)  |     |    |
|-------|-----|----|
| y.    | mo. | d. |
| 1841  | 8   | 1  |
| 1837  | 6   | 29 |
| <hr/> |     |    |
| 4     | 1   | 2  |

\$ 17.18  
 .245 $\frac{1}{2}$   
8590  
 6872  
 3436  
 572  
\$ 4.21,482

| (6.)  |     |    |
|-------|-----|----|
| y.    | mo. | d. |
| 1843  | 0   | 11 |
| 1839  | 9   | 9  |
| <hr/> |     |    |
| 3     | 3   | 2  |

\$ 847.15  
 .195 $\frac{1}{2}$   
423575  
 762435  
 84715  
 28238  
\$ 165.47,663

| (9.)  |     |    |
|-------|-----|----|
| y.    | mo. | d. |
| 1842  | 2   | 9  |
| 1839  | 6   | 25 |
| <hr/> |     |    |
| 2     | 7   | 14 |

\$ 144  
 .157 $\frac{1}{2}$   
1008  
 720  
 14448  
 22.656  
 144  
\$ 166.65,6

(10.)

| y.               | mo.       | d.        | y.                 | mo.      | d. |
|------------------|-----------|-----------|--------------------|----------|----|
| 1842             | 0         | 1         | 1842               | 0        | 1  |
| 1840             | 0         | 19        | 1841               | 3        | 23 |
| <u>1</u>         | <u>11</u> | <u>12</u> | <u>8</u>           | <u>8</u> |    |
| \$ 375.83        |           |           | \$ 76.19           |          |    |
| .117             |           |           | .041 $\frac{1}{2}$ |          |    |
| <u>263081</u>    |           |           | <u>7619</u>        |          |    |
| 37583            |           |           | 30476              |          |    |
| <u>37583</u>     |           |           | <u>2539</u>        |          |    |
| 43.97,211        |           |           | 3.14,918           |          |    |
| <u>375.83</u>    |           |           | <u>76.19</u>       |          |    |
| 419.80,211       |           |           | \$ 79.33,918       |          |    |
| <u>79.33,918</u> |           |           |                    |          |    |
| \$ 499.14,129    |           |           |                    |          |    |

(11.)

| y.                | mo.      | d.       | y.   | mo. | d. |
|-------------------|----------|----------|------|-----|----|
| 1841              | 5        | 11       | 1841 | 5   | 11 |
| 1840              | 5        | 5        | 1840 | 5   | 5  |
| <u>1</u>          | <u>0</u> | <u>6</u> |      |     |    |
| \$ 68.19          |          |          |      |     |    |
| .061              |          |          |      |     |    |
| <u>6819</u>       |          |          |      |     |    |
| 40914             |          |          |      |     |    |
| <u>6)4.15,959</u> |          |          |      |     |    |
| .69,326           |          |          |      |     |    |
| \$ 4.85,285       |          |          |      |     |    |

(12.)

| y.                               | mo.       | d.        |
|----------------------------------|-----------|-----------|
| 1842                             | 11        | 30        |
| 1839                             | 1         | 17        |
| <u>3</u>                         | <u>10</u> | <u>13</u> |
| \$ 79.15                         |           |           |
| .232 $\frac{1}{2}$               |           |           |
| <u>15830</u>                     |           |           |
| 23745                            |           |           |
| <u>15830</u>                     |           |           |
| 1319                             |           |           |
| <u>6)18.37,599</u>               |           |           |
| 3.06,266                         |           |           |
| <u>7<math>\frac{1}{2}</math></u> |           |           |
| 21.43,862                        |           |           |
| <u>1.53,133</u>                  |           |           |
| 22.96,995                        |           |           |
| <u>79.15</u>                     |           |           |
| \$ 102.11,995                    |           |           |

(13.)

| y.                 | mo.      | d.        |
|--------------------|----------|-----------|
| 1841               | 11       | 9         |
| 1840               | 5        | 19        |
| <u>1</u>           | <u>5</u> | <u>20</u> |
| \$ 89.96           |          |           |
| .088 $\frac{1}{2}$ |          |           |
| <u>71968</u>       |          |           |
| 71968              |          |           |
| <u>2998</u>        |          |           |
| 6)7.94,646         |          |           |
| <u>1.32,441</u>    |          |           |
| 8 $\frac{1}{2}$    |          |           |
| 10.59,528          |          |           |
| <u>.33,110</u>     |          |           |
| 10.92,638          |          |           |
| <u>89.96</u>       |          |           |
| \$ 100.88,638      |          |           |

(14.)

| y.                               | mo.      | d.        |
|----------------------------------|----------|-----------|
| 1841                             | 6        | 4         |
| 1839                             | 5        | 5         |
| <u>2</u>                         | <u>0</u> | <u>29</u> |
| \$ 325.00                        |          |           |
| .124 $\frac{1}{2}$               |          |           |
| <u>130000</u>                    |          |           |
| 65000                            |          |           |
| <u>32500</u>                     |          |           |
| 27000                            |          |           |
| <u>6)40.57,000</u>               |          |           |
| 6.76,166                         |          |           |
| <u>7<math>\frac{1}{2}</math></u> |          |           |
| 47.33,162                        |          |           |
| <u>1.69,041</u>                  |          |           |
| 49.02,203                        |          |           |
| <u>325.</u>                      |          |           |
| \$ 374.02,203                    |          |           |

## KEY TO

(15.)

| y.    | mo. | d. |
|-------|-----|----|
| 1842  | 9   | 9  |
| 1839  | 11  | 29 |
| <hr/> |     |    |
| 2     | 9   | 10 |

\$ 1728

.166 $\frac{2}{3}$ 

---

10368

10368

1728

---

1152

6)288.000

---

48.000

9

---

432.000

---

1728.

---

\$ 2160.000

(16.)

| y.    | mo. | d. |
|-------|-----|----|
| 1842  | 6   | 4  |
| 1841  | 0   | 29 |
| <hr/> |     |    |
| 1     | 5   | 5  |

\$ 976.18

.085 $\frac{1}{2}$ 

---

488090

780944

81348

---

83.78,878

2

---

\$ 167.57,756

(17.)

| y.    | mo. | d. |
|-------|-----|----|
| 1843  | 8   | 7  |
| 1839  | 5   | 19 |
| <hr/> |     |    |
| 4     | 2   | 18 |

\$ 176.17

.253

---

52851

88085

---

35234

6)44.57,101

---

7.42,8509 $\frac{1}{2}$ 

---

66.85,650

---

5.57,137

---

\$ 72.42,787

(18.)

| y.    | mo. | d. |
|-------|-----|----|
| 1847  | 7   | 23 |
| 1808  | 11  | 3  |
| <hr/> |     |    |
| 38    | 8   | 20 |

\$ 379.78

2.323 $\frac{1}{2}$ 

---

113934

75956

113934

75956

---

12659

6)882.35,553

---

147.05,9257 $\frac{1}{2}$ 

---

1029.41,475

---

110.29,443

---

1139.70,918

---

379.78

---

\$ 1519.48,918

(19.)

| y.    | mo. | d. |
|-------|-----|----|
| 1843  | 8   | 25 |
| 1841  | 4   | 7  |
| <hr/> |     |    |
| 2     | 4   | 18 |

\$ 175.08

.143

---

52524

70032

17508

6)25.03,644

---

4.17,274

---

29.20,918

---

175.08

---

\$ 204.28,9

(20.)

| y.    | mo. | d. |
|-------|-----|----|
| 1844  | 8   | 9  |
| 1843  | 11  | 11 |
| <hr/> |     |    |
| 8     | 28  |    |

\$ 160

.044 $\frac{1}{2}$ 

---

640

640

---

106

6)7.14,6

---

1.19,1

---

8.33,7

---

160

---

\$ 168.33,7

(21.)

| y.    | mo. | d. |
|-------|-----|----|
| 1843  | 6   | 4  |
| 1841  | 1   | 26 |
| <hr/> |     |    |
| 2     | 4   | 8  |

\$ 857.16  
   .141½  


---

 85716  
 342864  
 85716  
 28572  


---

 6)121.14,528  
 20.19,088  
       7½  


---

 141.33,616  
 5.04,772  


---

 \$ 146.38,388

(22.)

| y.    | mo. | d. |
|-------|-----|----|
| 1844  | 6   | 17 |
| 1842  | 2   | 15 |
| <hr/> |     |    |
| 2     | 4   | 2  |

\$ 171.18  
   .140½  


---

 684720  
 17118  
 5706  


---

 24.02,226  
       9  


---

 6)216.20,034  
   \$36.03,389

(23.)

| y.    | mo. | d. |
|-------|-----|----|
| 1844  | 10  | 9  |
| 1843  | 7   | 17 |
| <hr/> |     |    |
| 1     | 2   | 22 |

\$ 97.19  
   .073½  


---

 29157  
 68033  
 6479  


---

 6)7.15,966  
   1.19,327  


---

 \$ 8.35,293

(24.)

| y.    | mo. | d. |
|-------|-----|----|
| 1843  | 9   | 11 |
| 1840  | 11  | 19 |
| <hr/> |     |    |
| 2     | 9   | 22 |

\$ 765.75  
   .168½  


---

 612600  
 459450  
 76575  
 51050  


---

 129.15,650  
 765.75  


---

 \$ 894.90,6

(25.)

| y.    | mo. | d. |
|-------|-----|----|
| 1843  | 2   | 9  |
| 1841  | 5   | 7  |
| <hr/> |     |    |
| 1     | 9   | 2  |

\$ 760.75  
   .105½  


---

 380375  
 76075  
 25358  


---

 6)80.13,233  
   13.35,538  


---

 \$ 93.48,771



## PARTIAL PAYMENTS.

(ART. 203, p. 208.)

(2.)

|                                              |            |
|----------------------------------------------|------------|
| Principal, . . . . .                         | \$ 987.75  |
| Interest for 9 months, 2 days, . . . . .     | 44.77      |
| Amount, . . . . .                            | \$ 1032.52 |
| First payment, . . . . .                     | \$ 300.00  |
| Interest for 7 months, 12 days, . . . . .    | 11.10      |
| Second payment, . . . . .                    | 400.00     |
| Interest for 6 months, 8 days, . . . . .     | 12.53      |
| Third payment, . . . . .                     | 150.00     |
| Interest for 2 months, 18 days, . . . . .    | 1.95       |
|                                              | \$ 875.58  |
| Balance remains due Dec. 13, 1842, . . . . . | \$ 156.94  |

| y.           | mo. | d. | y.         | mo. | d. | y.         | mo. | d. | y.        | mo. | d. |
|--------------|-----|----|------------|-----|----|------------|-----|----|-----------|-----|----|
| 1842         | 11  | 13 | 1842       | 11  | 13 | 1842       | 11  | 13 | 1842      | 11  | 13 |
| 1842         | 0   | 11 | 1842       | 4   | 1  | 1842       | 5   | 5  | 1842      | 8   | 25 |
|              | 11  | 2  |            | 7   | 12 |            | 6   | 8  |           | 2   | 18 |
|              | 2   | 0  |            |     |    |            |     |    |           |     |    |
|              | 9   | 2  |            |     |    |            |     |    |           |     |    |
| \$ 987.75    |     |    | \$ 300     |     |    | \$ 400     |     |    | \$ 150    |     |    |
| .045½        |     |    | .037       |     |    | .031½      |     |    | .013      |     |    |
| 493875       |     |    | 2100       |     |    | 400        |     |    | 450       |     |    |
| 395100       |     |    | 900        |     |    | 1200       |     |    | 150       |     |    |
| 32925        |     |    |            |     |    | 133        |     |    |           |     |    |
| \$ 44.77,800 |     |    | \$ 11.10,0 |     |    | \$ 12.53,3 |     |    | \$ 1.95,0 |     |    |

(3.)

|                                            |           |
|--------------------------------------------|-----------|
| Principal, . . . . .                       | \$ 800.00 |
| Interest for 10 months, 27 days, . . . . . | 43.60     |
| Amount, . . . . .                          | \$ 843.60 |
| First payment, . . . . .                   | \$ 144.00 |
| Interest for 9 months, 21 days, . . . . .  | 6.98      |
| Second payment, . . . . .                  | 90.00     |
| Interest for 7 months, . . . . .           | 3.15      |
| Amounts carried forward, . . . . .         | \$ 244.13 |
|                                            | \$ 843.60 |

|                                 |           |                  |
|---------------------------------|-----------|------------------|
| Amounts brought forward,        | \$ 244.13 | \$ 843.60        |
| Third payment,                  | 400.00    |                  |
| Interest for 5 months,          | 10.00     |                  |
| Fourth payment,                 | 100.00    |                  |
| Interest for 2 months, 27 days, | 1.45      |                  |
|                                 |           | <u>\$ 755.58</u> |
| Remains due June 1, 1843,       |           | \$ 88.02         |

| y.    | mo. | d. |
|-------|-----|----|
| 1843  | 5   | 1  |
| 1842  | 6   | 4  |
| <hr/> |     |    |
| 10    | 27  |    |

\$ 800  
 .054½  
 3200  
 4000  
 400  
\$ 43.60,0

| y.    | mo. | d. |
|-------|-----|----|
| 1843  | 5   | 1  |
| 1842  | 7   | 10 |
| <hr/> |     |    |
| 9     | 21  |    |

\$ 144  
 .048½  
 1152  
 576  
 72  
\$ 6.98,4

| y.    | mo. | d. |
|-------|-----|----|
| 1843  | 5   | 1  |
| 1842  | 10  | 1  |
| <hr/> |     |    |
| 7     | 0   |    |

\$ 90  
 .035  
 450  
 270  
\$ 3.15,0

| y.    | mo. | d. |
|-------|-----|----|
| 1843  | 5   | 1  |
| 1843  | 0   | 1  |
| <hr/> |     |    |
| 5     | 0   |    |

\$ 400  
 .025  
 2000  
 800  
\$ 10.00,0

| y.    | mo. | d. |
|-------|-----|----|
| 1843  | 5   | 1  |
| 1843  | 2   | 4  |
| <hr/> |     |    |
| 2     | 27  |    |

\$ 100  
 .014½  
 400  
 100  
 50  
\$ 1.45,0

(ART. 204, p. 211.)

(2.)

|                                                 |                   |
|-------------------------------------------------|-------------------|
| Principal, carrying interest from June 5, 1838, | \$ 1666.00        |
| Interest from June 5, 1838, to January 1, 1841, |                   |
| 30 months, 26 days,                             | 257.11            |
| Amount carried forward,                         | <u>\$ 1923.11</u> |

|                                                                            |               |
|----------------------------------------------------------------------------|---------------|
| Amount brought forward, . . .                                              | \$ 1923.11    |
| First payment, July 4, 1839, a sum less<br>than the interest, . . . . .    | \$ 100.00     |
| Second payment, Jan. 1, 1840, a sum less<br>than the interest, . . . . .   | 10.00         |
| Third payment, July 4, 1840, a sum less<br>than the interest, . . . . .    | 15.00         |
| Fourth payment, Jan. 1, 1841, a sum larger<br>than the interest, . . . . . | <u>500.00</u> |

625.00

1298.11

|                                                                              |       |
|------------------------------------------------------------------------------|-------|
| Interest from Jan. 1, 1841, to Feb. 7, 1842, 13<br>months, 6 days, . . . . . | 85.67 |
|------------------------------------------------------------------------------|-------|

Amount, 1383.78

|                                        |               |
|----------------------------------------|---------------|
| Fifth payment, Feb. 7, 1842, . . . . . | <u>656.00</u> |
|----------------------------------------|---------------|

727.78

|                                                                               |       |
|-------------------------------------------------------------------------------|-------|
| Interest from Feb. 7, 1842, to Jan. 1, 1843, 10<br>months, 24 days, . . . . . | 39.30 |
|-------------------------------------------------------------------------------|-------|

|                                     |           |
|-------------------------------------|-----------|
| Remains due Jan. 1, 1843, . . . . . | \$ 767.08 |
|-------------------------------------|-----------|

(3.)

|                                                     |           |
|-----------------------------------------------------|-----------|
| Principal on interest from Oct. 23, 1840, . . . . . | \$ 960.00 |
|-----------------------------------------------------|-----------|

|                                                                                 |       |
|---------------------------------------------------------------------------------|-------|
| Interest from Oct. 23, 1840, to Sept. 25, 1841,<br>11 months, 2 days, . . . . . | 61.97 |
|---------------------------------------------------------------------------------|-------|

Amount, 1021.97

|                                          |               |
|------------------------------------------|---------------|
| First payment, Sept. 25, 1841, . . . . . | <u>140.00</u> |
|------------------------------------------|---------------|

|                                                                 |        |
|-----------------------------------------------------------------|--------|
| New principal, carrying interest from Sept. 25, 1841, . . . . . | 881.97 |
|-----------------------------------------------------------------|--------|

|                                                                                |       |
|--------------------------------------------------------------------------------|-------|
| Interest from Sept. 25, 1841, to July 7, 1842,<br>9 months, 12 days, . . . . . | 48.36 |
|--------------------------------------------------------------------------------|-------|

Amount, 930.33

|                                         |              |
|-----------------------------------------|--------------|
| Second payment, July 7, 1842, . . . . . | <u>80.00</u> |
|-----------------------------------------|--------------|

|                                                               |        |
|---------------------------------------------------------------|--------|
| New principal, carrying interest from July 7, 1842, . . . . . | 850.33 |
|---------------------------------------------------------------|--------|

|                                                                             |       |
|-----------------------------------------------------------------------------|-------|
| Interest from July 7, 1842, to Dec. 9, 1842, 5 months,<br>2 days, . . . . . | 25.13 |
|-----------------------------------------------------------------------------|-------|

Amount carried forward, \$ 875.46

|                                                     |               |
|-----------------------------------------------------|---------------|
| Amount brought forward,                             | \$ 875.46     |
| Third payment, Dec. 9, 1842,                        | <u>70.00</u>  |
| New principal, carrying interest from Dec. 9, 1842, | 805.46        |
| Interest from Dec. 9, 1842, to Nov. 8, 1843,        |               |
| 10 months, 29 days,                                 | <u>51.52</u>  |
| Amount,                                             | 856.98        |
| Fourth payment, Nov. 8, 1842,                       | <u>100.00</u> |
| New principal, carrying interest Nov. 8, 1843,      | 756.98        |
| Interest from Nov. 8, 1843, to Oct. 23, 1844,       |               |
| 11 months, 15 days,                                 | <u>50.78</u>  |
| Balance due Oct. 23, 1844,                          | \$ 807.76     |

## (4.)

|                                                         |               |
|---------------------------------------------------------|---------------|
| Principal on interest from March 1, 1839,               | \$ 1000.00    |
| Interest from March 1, 1839, to March 1, 1840,          |               |
| 12 months,                                              | <u>70.00</u>  |
| Amount,                                                 | 1070.00       |
| First payment, March 1, 1840,                           | <u>100.00</u> |
| Principal, carrying interest from March 1, 1840,        | 970.00        |
| Interest from March 1, 1840, to Sept. 25, 1841,         |               |
| 18 months, 24 days,                                     | <u>106.37</u> |
| Amount,                                                 | 1076.37       |
| Second payment, Sept. 25, 1841,                         | <u>200.00</u> |
| Principal carrying interest from Sept. 25, 1841,        | 876.37        |
| Interest from Sept. 25, 1841, to Oct. 9, 1842,          |               |
| 12 months, 14 days,                                     | <u>63.73</u>  |
| Amount,                                                 | 940.10        |
| Third payment, Oct. 9, 1842,                            | <u>150.00</u> |
| Principal carrying interest from Oct. 9, 1842,          | 790.10        |
| Interest from Oct. 9, 1842, to Oct. 9, 1843, 12 months, | <u>55.30</u>  |
| Amount carried forward,                                 | \$ 845.40     |

|                                                                             |               |
|-----------------------------------------------------------------------------|---------------|
| Amount brought forward, \$845.40                                            |               |
| Fourth payment, July 4, 1843, a sum less than the interest, . . . . .       | \$20.00       |
| Fifth payment, Oct. 9, 1843, a sum greater than the interest, . . . . .     | <u>300.00</u> |
|                                                                             | 320.00        |
| Principal carrying interest from Oct 9, 1843, . . . . .                     | 525.40        |
| Interest from -Oct. 9, 1843, to Dec. 1, 1844, 13 months, 22 days, . . . . . | <u>42.09</u>  |
| Balance due Dec. 1, 1844, . . . . .                                         | \$567.49      |

## PROBLEMS IN INTEREST.

2. (ART. 207, p. 213.)  $\$250 \times .0125 = \$3.125$ ;  $\$28.125 \div 3.125 = 9$  per cent., Ans.
3.  $\$72 \times .0175 = \$1.26$ ;  $\$8.82 \div 1.26 = 7$  per cent., Ans.
4.  $\$500 \times .025 = \$12.50$ ;  $\$550 - \$500 = \$50$ ;  $\$50 \div 12.50 = 4$  per cent. Ans.
2. (ART. 208.)  $\$140 \times .06 = \$8.40$ ;  $\$42.00 \div 8.40 = 5$  years, Ans.
3.  $\$165 \times .06 = \$9.90$ ;  $\$14.85 \div 9.90 = 1$  year, 6 months, Ans.
4.  $\$98 \times .08 = \$7.84$ ;  $\$25.48 \div 7.84 = 3$  years, 3 months, Ans.
5.  $\$727.60 - \$680 = \$47.60$ ;  $\$680 \times .04 = \$27.20$ ;  $\$47.60 \div 27.20 = 1$  year, 9 months, Ans.
2. (ART. 209, p. 214.)  $\$1.00 \times .255 = \$0.255$ ;  $\$24.225 \div .255 = \$95$  Ans.
3.  $\$1.00 \times .28 = \$0.28$ ;  $\$5.11 \div .28 = \$18.25$  Ans.
4.  $\$1.00 \times .15 = \$0.15$ ;  $\$42 \div .15 = \$280$  Ans.

## COMPOUND INTEREST.

2. (ART. 211, p. 216.)  $1.06 \times 1.06 \times 1.06 \times 1.06 \times$   
 $\$ 761.75 = \$ 961.69,1$ ;  $\$ 961.69,1 - \$ 761.75 =$   
 $\$ 199.94,1$  Ans.
3.  $1.06 \times 1.06 \times 1.06 \times \$ 67.25 = \$ 80.09,5$  Ans.
4.  $1.07 \times 1.07 \times 1.07 \times 1.07 \times 1.07 \times \$ 78.69 =$   
 $\$ 110.36,4$  Ans.
5.  $1.06 \times 1.06 \times 1.06 \times 1.028 \times \$ 128 = \$ 156.71,7$  Ans.
6.  $1.06 \times 1.06 \times 1.041\frac{1}{2} \times \$ 76.18 = \$ 89.14,7$ ;  $\$ 89.14,7$   
 $- \$ 76.18 = \$ 12.96,7$  Ans.
2. (ART. 212, p. 217.)  $\$ 1.315931$ , amount of  $\$ 1$  for 7  
years at 4 per cent.;  $\$ 884 \times 1.315931 = \$ 1163.28,3$ ;  
 $\$ 1163.28,3 - \$ 884 = \$ 279.28,3$  Ans.
3.  $\$ 1.551328$ , amount of  $\$ 1$  for 9 years at 5 per cent.;  
 $\$ 721 \times 1.551328 = \$ 1118.50,7$ ;  $\$ 1118.50,7 - \$ 721$   
 $= \$ 397.50,7$  Ans.
4.  $\$ 1.425760$ , amount of  $\$ 1$  for 12 years at 3 per cent.;  
 $\$ 960 \times 1.425760 = \$ 1368.72,96$ ;  $\$ 1.015$ , amount  
of  $\$ 1$  for 6 months at 3 per cent.;  $\$ 1368.72,96 \times$   
 $1.015 = \$ 1389.26$  Ans.
5.  $\$ 3.869685$ , amount of  $\$ 1$  for 20 years, at 7 per cent.;  
 $\$ 25.50 \times 3.869685 = \$ 98.67,696$ ;  $\$ 1.014$ , amount  
of  $\$ 1$  for 2 months and 12 days at 7 per cent.;  
 $\$ 98.67,696 \times 1.014 = \$ 100.05,8$  Ans.
6.  $\$ 1.005$ , amount of  $\$ 1$  for 1 month;  $\$ 1.005 \times 1.005 \times$   
 $1.005 \times 1.005 \times 1.005 \times 1.005 = \$ 1.03037$ , amount of  
 $\$ 1$  for 6 months;  $\$ 1.03037 \times 12 = \$ 12.36,444 +$  Ans.
7.  $\$ 1.000\frac{1}{3}$ , amount of  $\$ 1$  for 1 day;  $\$ 1.000\frac{1}{3} \times 1.000\frac{1}{3} \times$   
 $1.000\frac{1}{3} \times 1.000\frac{1}{3} \times 1.000\frac{1}{3} \times 1.000\frac{1}{3} = \$ 1.0010006 +$ ,  
amount of  $\$ 1$  for 6 days;  $\$ 1.0010006 + \times 100 =$   
 $\$ 100.10,006 +$  Ans.

## DISCOUNT.

2. (ART. 216, p. 219.) \$ 1.06 amount of \$ 1 for 1 year;  
 $\$ 152.64 \div 1.06 = \$ 144$  Ans.
3. \$ 1.24 amount of \$ 1 for 4 years;  $\$ 477.71 \div 1.24 =$   
 $\$ 385.25$  Ans.
4. \$ 1.20 amount of \$ 1 for 3 years, 4 months;  $\$ 172.86 \div$   
 $1.20 = \$ 144.05$ ;  $\$ 172.86 - \$ 144.05 = \$ 28.81$  Ans.
5. \$ 1.218 amount of \$ 1 for 3 years, 7 months, 18 days;  
 $\$ 800 \div 1.218 = \$ 656.814 +$ ;  $\$ 800 - \$ 656.814$   
 $= \$ 143.18,6$  Ans.
6. 

|       |     |    |
|-------|-----|----|
| y.    | mo. | d. |
| 1844  | 0   | 1  |
| 1842  | 9   | 4  |
| <hr/> |     |    |
| 1     | 2   | 27 |

 \$ 1.0745 amount of \$ 1.00 for 1 year,  
2 months, 27 days;  $\$ 375.75 \div$   
 $1.0745 = \$ 349.69,7$  Ans.
7. 

|       |     |    |
|-------|-----|----|
| y.    | mo. | d. |
| 1843  | 3   | 5  |
| 1843  | 0   | 1  |
| <hr/> |     |    |
| 3     | 4   |    |

 \$ 1.015 $\frac{1}{2}$  amount of \$ 1.00 for 3 months,  
4 days;  $\$ 125.75 \div 1.015\frac{1}{2} =$   
 $\$ 123.81 +$  Ans.

## BANK DISCOUNT.

(ART. 218, p. 221.)

| (2.)               | (3.)               | (4.)              | (5.)              |
|--------------------|--------------------|-------------------|-------------------|
| \$ 478             | \$ 780             | \$ 1728           | \$ 1000           |
| .010 $\frac{1}{2}$ | .005 $\frac{1}{2}$ | .15 $\frac{1}{2}$ | .20 $\frac{1}{2}$ |
| <hr/>              | <hr/>              | <hr/>             | <hr/>             |
| 4780               | 3900               | 8640              | 20000             |
| 239                | 390                | 1728              | 500               |
| <hr/>              | <hr/>              | <hr/>             | <hr/>             |
| \$ 5.01,9          | \$ 4.29,0          | 864               | \$ 20.50,0        |
|                    |                    | \$ 26.78,4        |                   |
|                    |                    |                   | \$ 1000           |
|                    |                    |                   | 20.50             |
|                    |                    |                   | <hr/>             |
|                    |                    |                   | Ans. \$ 979.50    |

| (6.)                | (7.)                | (8.)                |
|---------------------|---------------------|---------------------|
| \$ 875.35           | \$ 596.24           | \$ 1350.50          |
| .038                | .042                | .080½               |
| <u>700280</u>       | <u>119248</u>       | <u>10804000</u>     |
| 262605              | 238496              | 67525               |
| 6)33.26,330         | 25.04,208           | 108.71,525          |
| 5.54,386            | 8                   | 5                   |
| <u>\$ 38.80,716</u> | <u>6)200.33,664</u> | <u>6)543.57,625</u> |
| \$ 875.35,0         | \$ 33.38,944        | Ans. \$ 90.59,604   |
| 38.80,7             | \$ 596.24,0         |                     |
| \$ 836.54,2 Ans.    | 33.38,9             |                     |
|                     | \$ 562.85,1 Ans.    |                     |

2. (ART. 219, p. 222.) \$ 1.0000 — .0205 = .9795 ; \$ 300 ÷ .9795 = \$ 306.27,8 Ans.
3. \$ 1.0000 — .0305 = .9695 ; \$ 4572.40 ÷ .9695 = \$ 4716.24,5 Ans.
4. \$ 1.0000 — .0255 = .9745 ; \$ 1000 ÷ .9745 = \$ 1026.16,7 Ans.
5. \$ 1.000000 — .50625 = .49375 ; \$ 483.56 ÷ .49375 = \$ 509.34,5 Ans.

### COMMISSION AND BROKERAGE.

(ART. 221, p. 223.)

| (2.)             | (3.)             | (4.)        | (5.)               |
|------------------|------------------|-------------|--------------------|
| \$ 5678          | \$ 7896          | \$ 1728     | \$ 15.50           |
| .03              | .02              | .01½        | 97                 |
| <u>\$ 170.34</u> | <u>\$ 157.92</u> | <u>1728</u> | <u>10850</u>       |
|                  |                  | 864         | 13950              |
|                  |                  | \$ 25.92    | 1503.50            |
|                  |                  |             | .02½               |
|                  |                  |             | 30.07,00           |
|                  |                  |             | 7.51,75            |
|                  |                  |             | <u>\$ 37.58,75</u> |



| (6.)                | (7.)        | (8.)              |
|---------------------|-------------|-------------------|
| \$ 6.50             | \$ 2.75     | \$ 46256          |
| 500                 | 88          | .00 $\frac{1}{2}$ |
| <u>3250.00</u>      | <u>2200</u> | <u>\$ 57.82</u>   |
| 242.00              | 2200        |                   |
| <u>593.60</u>       | \$ 242.00   |                   |
| 4085.60             |             |                   |
| .03 $\frac{1}{2}$   |             |                   |
| <u>1225680</u>      |             |                   |
| 306420              |             |                   |
| <u>\$ 153.21,00</u> |             |                   |

2. (ART. 222, p. 224.) \$ 2000  $\div$  1.01,5 = \$ 1970.44,3,  
sum invested; \$ 2000 — \$ 1970.44,3 = \$ 29.55,7, com-  
mission, Ans.
3. \$ 5256  $\div$  1.03 = \$ 5102.91,2; \$ 5256 — \$ 5102.91,2  
= \$ 153.08,8 Ans.
4. \$ 3865.94  $\div$  1.04 = \$ 3717.25, sum expended; \$ 3865.94  
— \$ 3717.25 = \$ 148.69, commission, Ans.
5. \$ 10000  $\div$  1.03,25 = \$ 9685.23+, value of flour; \$ 10000  
— \$ 9685.23+ = \$ 314.76+, commission, Ans.

## STOCKS.

3. (ART. 224, p. 225.) \$ 115  $\times$  10 = \$ 1150 Ans.
4. \$ 125  $\times$  .75 = \$ 9375 Ans.
5. \$ 8979  $\times$  1.12 = \$ 10056.48 Ans.
6. \$ 1789  $\times$  .91 = \$ 1627.99 Ans.
7. \$ 100  $\times$  .12 = \$ 12; \$ 12  $\times$  5 = \$ 60 Ans.
8. \$ 100 — \$ 12.50 = \$ 87.50; \$ 87.50  $\times$  20 = \$ 1750 Ans.
9. \$ 100 + \$ 8.25 = \$ 108.25; \$ 108.25  $\times$  15 = \$ 1623.75,  
Ans.
10. \$ 175  $\times$  .12 = \$ 21; \$ 175 — \$ 21 = \$ 154; \$ 154  $\times$   
.87 = \$ 13398; \$ 175  $\times$  .19 $\frac{1}{2}$  = \$ 34.12 $\frac{1}{2}$ ; \$ 175 +  
\$ 34.12 $\frac{1}{2}$  = \$ 209.12 $\frac{1}{2}$ ; \$ 209.12 $\frac{1}{2}$   $\times$  87 = \$ 18193.87 $\frac{1}{2}$ ,  
\$ 18193.87 $\frac{1}{2}$  — \$ 13398.00 = \$ 4795.87 $\frac{1}{2}$  Ans.

## INSURANCE.

(ART. 226, p. 226.)

| (2.)             | (3.)             | (4.)              |
|------------------|------------------|-------------------|
| \$ 868           | \$ 1728          | \$ 3500           |
| .12              | .15              | .01 $\frac{1}{4}$ |
| <u>\$ 104.16</u> | <u>8640</u>      | <u>3500</u>       |
|                  | 1728             | 2625              |
|                  | <u>\$ 259.20</u> | <u>\$ 61.25</u>   |

| -(5.)                   | (6.)                       |
|-------------------------|----------------------------|
| \$ 35000                | \$ 75000                   |
| .03 $\frac{1}{2}$       | .02 $\frac{1}{2}$          |
| <u>105000</u>           | <u>150000</u>              |
| 26250                   | 37500                      |
| <u>\$ 1312.50</u>       | <u>\$ 1875.00</u> premium. |
| \$ 35000.00             | \$ 75000                   |
| 1312.50                 | 1875                       |
| <u>Ans. \$ 33687.50</u> | <u>\$ 73125</u> loss.      |

## DUTIES.

(ART. 228, p. 228.)

| (2.)              | (3.)              | (4.)             |
|-------------------|-------------------|------------------|
| 560lb.            | 368lb.            | 187              |
| <u>4</u>          | <u>4</u>          | 196              |
| 556               | 364               | 216              |
| <u>44</u>         | <u>44</u>         | 150              |
| 512               | 320               | <u>749</u>       |
| <u>144</u>        | <u>760</u>        | 15 leakage.      |
| 2048              | 19200             | <u>734</u>       |
| 2048              | <u>2240</u>       | 20               |
| 512               | 243200            | <u>714</u>       |
| <u>73728</u>      | <u>.02</u>        | .25              |
| .03               | <u>\$ 4864.00</u> | <u>3570</u>      |
| <u>\$ 2211.84</u> |                   | <u>1428</u>      |
|                   |                   | <u>\$ 178.50</u> |

2. (ART. 229, p. 228.)  $\$3200 \times .20 = \$640$  Ans.  
 3. 1 Ton = 2240lb.;  $2240\text{lb.} - 9\text{lb.} = 2231\text{lb. net}$ ;  $2231 \times .04 = \$89.24$ ;  $\$89.24 \times .30 = \$26.77, 2$ , duty, Ans.  
 4.  $1698\text{lb.} - 7\text{lb.} = 1691\text{lb. net weight}$ ;  $1691 \times .05 = \$84.55$ ;  $\$84.55 \times .20 = \$16.91$ , duty, Ans.  
 5.  $150 \times 10 = 1500$ ;  $1500 - 30 = 1470$ ;  $1470 - 50 = 1420$ ;  $1420 \times .25 = \$355$ ;  $\$355 \times .20 = \$71$ , duty, Ans.  
 6.  $450\text{lb.} - 4\text{lb.} = 446\text{lb.}$ ;  $446 \times .15 = 67$ ;  $446 - 67 = 379\text{lb.}$ ;  $379 \times 13 = 4927\text{lb. net weight}$ ;  $4927 \times .08 = \$394.16$ ;  $\$394.16 \times .30 = \$118.24$  Ans. [Ans.  
 7.  $1376 \times \$4.84 = \$6659.84$ ;  $\$6659.84 \times .33 = \$2197.74, 7$ ,

## ASSESSMENT OF TAXES.

(ART. 231, p. 230.)

(2.)

- $\$1.25 \times 600 = \$750$ , amount assessed on the polls.  
 $\$3600 - \$750 = \$2850$ , am't to be assessed on the property.  
 $\$560,000 + \$152,500 = \$712,500$ , am't of taxable property.  
 $\$2850 \div 712,500 = \$ .004$ , tax on  $\$1.00$ .  
 $\$4100 \times .004 = \$16.40$ , B.'s tax on real estate.  
 $\$1800 \times .004 = \$7.20$ , B.'s tax on personal property.  
 $\$1.25 \times 4 = \$5.00$ , B.'s tax on 4 polls.  
 $\$16.40 + \$7.20 + \$5.00 = \$28.60$ , B.'s tax.

(3.)

- $\$15,800 \times .004 = \$63.20$ , tax on C.'s property.  
 $\$1.25 \times 1 = \$1.25$ , C.'s tax on 1 poll.  
 $\$63.20 + \$1.25 = \$64.45$ , C.'s tax, Ans.

(4.)

- $\$40,000 \times .004 = \$160$ , tax on D.'s real estate.  
 $\$23,600 \times .004 = \$94.40$ , tax on D.'s personal property.  
 $\$1.25 \times 3 = \$3.75$ , D.'s tax for 3 polls.  
 $\$160 + \$94.40 + \$3.75 = \$258.15$ , am't of D.'s tax, Ans.

(ART. 232, p. 231.)

(1.)

 $\$1.50 \times 500 = \$750.00$ , amount assessed on the polls. $\$3900 - \$750 = \$3150$ , am't to be assessed on the property. $\$840,000 \div \$210,000 = \$1,050,000$ , am't of taxable property. $\$3150 \div 1,050,000 = \$.003$ , assessment on  $\$1.00$ .

(3.)

 $\$3175$  Tax on  $\$9000 = \$27.00$  $\$6535$  " 700 = 2.10 $\$9710$  " 10 = .03

6 polls = 9.00

Ans.  $\$38.13$ 

(4.)

Tax on  $\$7000 = \$21.00$ 

" 400 = 1.20

" 80 = .24

1 poll = 1.50

Ans.  $\$23.94$ 

(5.)

Tax on  $\$4000 = \$12.00$ 

" 700 = 2.10

" 90 = .27

2 polls = 3.00

Ans.  $\$17.37$ 

(6.)

Tax on  $\$12000 = \$36.00$ 

" 800 = 2.40

 $\$9280$  " 80 = .24 $\$3600$  " 4 polls = 6.00 $\$12880$ Ans.  $\$44.64$ 

## EQUATION OF PAYMENTS.

(ART. 234, p. 233.)

(2.)

 $\$250 \times 4 = 1000$  $\$350 \times 8 = 2800$  $\$400 \times 12 = 4800$  $\$1000$  1000)8600(8mo.

8000

600

30

1000)18000(18da.

18000

Ans. 8mo. 18da.

(3.)

 $\$390 \times 3 = 1170$  $\$312 \times 6 = 1872$  $\$260 \times 8 = 2080$  $\$598 \times 10 = 5980$  $\$1560$  1560)11102(7 $\frac{3}{10}$ mo.

10920

182

1560 = 7 $\frac{3}{10}$

(4.)

$$\begin{array}{rcl}
 \$1000 & & \\
 \$1000 \times 12 = & 12000 & \\
 \$2000 \times 24 = & 48000 & \\
 \hline
 \$4000 & 4000)60000(15\text{mo.} & 
 \end{array}$$

(5.)

$$\begin{array}{rcl}
 \$1250 & & \\
 \$1250 \times 6 = & 7500 & \\
 \$1000 \times 9 = & 9000 & \\
 \$1500 \times 12 = & 18000 & \\
 \hline
 \$5000 & 5000)34500(6\text{mo.} & \\
 & 30000 & \\
 & \hline
 & 4500 & \\
 & 30 & \\
 & \hline
 & 5000)135000(27\text{da.} & \\
 & 10000 & \\
 & \hline
 & 35000 & \\
 & 35000 & \\
 & \hline
 & & 
 \end{array}$$

(ART. 235, p. 235.)

(2.)

$$\begin{array}{rcl}
 \text{Due April 15, } \$96.46 & & \\
 \text{" 24, } 49.63 \times 9 = & 44667 & \\
 \text{May 1, } 175.80 \times 16 = & 281280 & \\
 \text{" 11, } 78.39 \times 26 = & 203814 & \\
 \text{Sept. 19, } 114.92 \times 157 = & 1804244 & \\
 \hline
 \$515.20 & 51520)2334005(45+\text{da.} & \\
 & 206080 & \\
 & \hline
 & 273205 & \\
 & 257600 & \\
 & \hline
 \text{Ans. May 31st, or in 46da.} & 15605 & 
 \end{array}$$

(3.)

$$\begin{array}{rcl}
 \text{Due May 7, 1841, } \$375.60 & & \\
 \text{Aug. 18, " } 687.25 \times 103 = & 7078675 & \\
 \text{Dec. 7, " } 568.50 \times 214 = & 12165900 & \\
 \text{March 1, 1842, } 100.00 \times 298 = & 2980000 & \\
 \text{" 25, " } 300.00 \times 322 = & 9660000 & \\
 \text{Aug. 5, " } 675.75 \times 455 = & 30746625 & \\
 \hline
 \$2707.10 & 270710)62631200(231+\text{da.} & \\
 & 541420 & \\
 & \hline
 & 848920 & \\
 & 812130 & \\
 & \hline
 & 367900 & \\
 & 270710 & \\
 & \hline
 \text{Ans. Dec. 25, or in 232da.} & 97190 & 
 \end{array}$$

(4.)

|                            |                       |                  |
|----------------------------|-----------------------|------------------|
| Due April 1, 1847,         | \$436.50              |                  |
| " 11, "                    | $129.50 \times 10 =$  | 129500           |
| July 15, "                 | $132.00 \times 105 =$ | 1386000          |
| Sept. 1, "                 | $405.00 \times 153 =$ | 6196500          |
| " 5, "                     | $72.00 \times 157 =$  | 1130400          |
| Oct. 25, "                 | $91.00 \times 207 =$  | 1883700          |
| Feb. 29, 1848,             | $120.00 \times 334 =$ | 4008000          |
|                            | <u>\$ 1386.00</u>     | <u>138600</u>    |
|                            |                       | 14734100(106+da. |
|                            |                       | <u>138600</u>    |
|                            |                       | 874150           |
|                            |                       | <u>831600</u>    |
| Ans. July 17, or in 107da. |                       | 42550            |

(5.)

|                      |                   |                  |
|----------------------|-------------------|------------------|
| Due July 1, 1844,    | \$300             |                  |
| Nov. 1, "            | $500 \times 4 =$  | 2000             |
| March 1, 1845,       | $200 \times 8 =$  | 1600             |
| Oct. 1, "            | $800 \times 15 =$ | 12000            |
| April 1, 1847,       | $400 \times 33 =$ | 13200            |
| July 1, "            | $900 \times 36 =$ | 32400            |
| Aug. 1, "            | $100 \times 37 =$ | 3700             |
|                      | <u>\$ 3200</u>    | <u>3200</u>      |
|                      |                   | 64900(20mo. 9da. |
|                      |                   | <u>6400</u>      |
|                      |                   | 900              |
|                      |                   | <u>30</u>        |
|                      |                   | 3200)27000(8+da. |
|                      |                   | <u>25600</u>     |
| Ans. March 10, 1846. |                   | 1400             |

---

## PROPORTION.

### SIMPLE PROPORTION.

5. (ART. 248, p. 241.) 63gal. : 9gal. :: \$ 14.49 : \$ 2.07 Ans.
6. 19A. : 97A. :: \$ 337.25 : \$ 1721.75 Ans.
7. 11da. : 47da. :: 319 miles : 1363 miles, Ans.
8. 4lb. : 48lb. :: 7lb. : 84lb. Ans.

9. \$ 5437.50 : \$ 7687.50 :: 87 tons : 123 tons, Ans.
10. 15bar. : 79bar. :: \$ 120 : \$ 632 Ans.
11. 3 days : 12 days :: 9 horses : 36 horses, Ans.
12. 7gal. : 27gal. :: \$ 5.88 : \$ 22.68 Ans.
13. 9lb. : 147lb. :: \$ 10.80 : \$ 176.40 Ans.
14. 9 tons : 27 tons :: \$ 85.95 : \$ 257.85 Ans.
15. 15 tons : 765 tons :: \$ 105 : \$ 5355 Ans.
16. 16hhd. : 176hhd. :: \$ 320 : \$ 3520 Ans.
17. 15cwt. 3qr. 17lb. = 1781lb. : 76cwt. 2qr. 19lb. = 8587lb.  
:: \$ 124.67 : \$ 601.09 Ans.
18. 7s. 6d. = 90d. : 76s. 19s. 11d. = 18479d. :: \$ 1 :  
\$ 205.32 $\frac{2}{3}$  Ans.
19. 8s. = 96d. : 19s. 8d. = 4796d. :: \$ 1 : \$ 49.95 $\frac{1}{4}$  Ans.
20. 4s. 8d. = 56d. : 176s. 18s. 4d. = 42460d. :: \$ 1 :  
\$ 758.21 $\frac{1}{4}$  Ans.
21. 4s. 6d. = 54d. : 769s. 18s. 9d. = 184785d. :: \$ 1 :  
\$ 3421.94 $\frac{1}{4}$  Ans.
22. 1m. : 32m. :: 2m. 8sec. = 128sec. : 4096sec. = 1h. 8m.  
16sec. Ans.
23. 1A. = 160p. : 144A. 3R. 17p. = 23177p. :: \$ 37.86 :  
\$ 5484.25 $\frac{1}{4}$  Ans.
24. 1h. = 3600sec. : 9h. 45m. 19sec. = 35119sec. :: 3m. 7fur.  
18rd. = 1258rd. : 12272 $\frac{1}{4}$ rd. = 38m. 2fur. 32 $\frac{1}{4}$ rd. Ans.
25. 21 — 15 = 6rd. : 21rd. :: 96rd. : 336rd. Ans.
26. 4 + 5 = 9 men : 5 men :: 12h. : 6 $\frac{2}{3}$ h. Ans.
27. 10 — 3 = 7 men : 10 men :: 63da. : 90da. Ans.
28. \$ 7.50 : \$ 5.00 :: 5oz. : 3 $\frac{1}{2}$ oz. Ans.
29. 13h. : 14h. :: 10da. : 10 $\frac{1}{4}$ da. Ans.
30. 40lb. : 79lb. :: 29lb. : 57 $\frac{1}{4}$ lb. Ans.
34. 11 $\frac{1}{4}$ yd. : 100yd. :: 4 $\frac{1}{4}$ yd. =  $\frac{17}{4}$  : 1 $\frac{1}{2}$  :  $\frac{1}{4}$  =  $\frac{1}{5}$   $\times$  1 $\frac{1}{2}$   
 $\times$   $\frac{1}{4}$  = 2 $\frac{1}{2}$  $\frac{1}{4}$  = 39 $\frac{1}{4}$  $\frac{1}{4}$ yd. Ans.
35. 5 $\frac{1}{4}$ cwt. : 25 $\frac{1}{4}$ cwt. :: 14 $\frac{1}{2}$ E. E. =  $\frac{1}{4}$  : 2 $\frac{1}{2}$  : 1 $\frac{1}{2}$ E. E.  
= 1 $\frac{1}{2}$   $\times$   $\frac{1}{4}$   $\times$   $\frac{1}{4}$  =  $\frac{1}{8}$ qr. =  $\frac{11}{61} \times \frac{282}{11} \times \frac{595}{32} = 1 $\frac{17}{16}$  $\frac{1}{2}$   
= 85yd. 3qr. 3 $\frac{1}{4}$ na. Ans.$

36. 48da. : 36da. :: 144 men : 108 men;  $144 - 108 = 36$  men, Ans.

37.  $\overset{d.}{6} : \overset{d.}{1} :: \overset{w.}{1} : \overset{w.}{\frac{1}{6}}$ , the part James will do in one day.

$8 : 1 :: 1 : \frac{1}{8}$ , the part John will do in one day.

$\frac{1}{6} + \frac{1}{8} = \frac{7}{24}$ , the part James and John will do in one day.

$\frac{7}{24}w. : 1w. :: 1da. : 3\frac{3}{4}da.$  Ans.

38. 9h. : 1h. :: 1w. :  $\frac{1}{9}w.$  = part Samuel will do in one day.

4h. : 1h. :: 1w. :  $\frac{1}{4}w.$  = part Samuel and Alfred will do in one day.

$\frac{1}{4} - \frac{1}{9} = \frac{5}{36}$  = part Alfred will do in one day.

$\frac{5}{36}w. : 1w. :: 1h. : 7\frac{1}{3}h.$  Ans.

39. 10da. : 1da. :: 1w. :  $\frac{1}{10}w.$  = part Atwood would do in a day.

7da. : 1da. :: 1w. :  $\frac{1}{7}w.$  = part Jerry and his father would do in a day.

6da. : 1da. :: 1w. :  $\frac{1}{6}w.$  = part Jacob and his father would do in a day.

$\frac{1}{7} - \frac{1}{10} = \frac{3}{70}$  = part Jerry would do in a day.

$\frac{1}{6} - \frac{1}{10} = \frac{1}{15}$  = part Jacob would do in a day.

$\frac{3}{70} + \frac{1}{15} = \frac{23}{210}$  = part Jerry and Jacob would do in a day.

$\frac{23}{210}w. : 1w. :: 1da. : 9\frac{2}{3}$  days, Ans.

41.  $\$5.00 \times 40 = \$200.00$ , price given for the cloth ;

$\$1.00 : \$1.15 :: \$200.00 : \$230.00$  Ans.

42.  $\$1.00 : \$0.70 :: \$175.00 : \$122.50$  Ans.

43.  $\$6.00 - \$5.00 = \$1.00$ ;

$\$5.00 : \$1.00 :: \$100 : 20$  per cent., Ans.

44.  $\$15.00 - \$12.00 = \$3.00$ ;

$\$15.00 : \$3.00 :: \$100 : 20$  per cent., Ans.

45.  $\frac{128}{100} - \frac{20}{100} = \frac{108}{100} : \frac{20}{100} :: \$60 : \$120$  Ans.

46.  $\$0.25 : \$27.50 :: 1gal. : 110$  gallons, Ans.

47.  $\$15.75 : \$1728 :: 1A. : 109A. 2R. 34\frac{1}{2}p.$  Ans.

48. If the first cock will empty the cistern in 2 hours, in 1 hour  $\frac{1}{2}$  of it will be emptied. The second cock will empty  $\frac{1}{3}$  of it in 1 hour. The third cock will empty  $\frac{1}{4}$  of it in 1 hour. Therefore, in 1 hour,  $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{13}{12}$  of the



cistern will be emptied. And if  $\frac{1}{2}$  of the cistern be emptied in 1 hour,  $\frac{1}{2}$ , or the whole cistern, will be emptied in  $55\frac{1}{3}$  minutes;  $\frac{1}{2} : \frac{1}{2} :: 60m. : 55\frac{1}{3}m.$  Ans.

## COMPOUND PROPORTION.

(ART. 250, p. 246.)

$$\begin{array}{c} (3.) \\ \$800 : \$100 \} :: 12mo. : 8mo. \text{ Ans. } \frac{100 \times 32 \times 12}{800 \times 6} = 8mo. \\ \$6 : \$32 \end{array}$$

$$\begin{array}{c} (4.) \\ \$6 : \$32 \} :: \$100 : \$800 \text{ Ans. } \frac{32 \times 12 \times 100}{6 \times 8} = \$800 \\ 8mo. : 12mo. \end{array}$$

$$\begin{array}{c} (5.) \\ \$800 : \$100 \} :: \$32 : \$6, \text{ that is, 6 per cent., Ans. } \\ 8mo. : 12mo. \end{array}$$

$$\frac{100 \times 12 \times 32}{800 \times 8} = \$6.$$

$$\begin{array}{c} (6.) \\ 20 \text{ men} : 15 \text{ men} \} :: 60 \text{ days} : 67\frac{1}{2} \text{ days, Ans. } \\ 10 \text{ hours} : 15 \text{ hours} \end{array}$$

$$\frac{15 \times 15 \times 60}{20 \times 10} = 1\frac{1}{2} = 67\frac{1}{2} \text{ days.}$$

$$\begin{array}{c} (7.) \\ 351bu. : 1404bu. \} :: 939 \text{ men} : 5634 \text{ men, Ans. } \\ 2w. : 3w. \end{array}$$

$$\frac{1404 \times 3 \times 939}{351 \times 2} = 5634 \text{ men.}$$

(8.)

8 men : 12 men }  
13 weeks : 52 weeks } :: \$ 64 : \$ 384 Ans.

$$\frac{12 \times \overset{4}{52} \times \overset{8}{64}}{8 \times 13} = \$ 384$$

(9.)

8 horses : 32 horses }  
24 days : 48 days } :: 42 bushels : 336 bushels, Ans.

$$\frac{32 \times \overset{4}{48} \times \overset{2}{42}}{8 \times 24} = 336 \text{ bushels.}$$

(10.)

24 men : 6 men }  
16 hours : 9 hours }  
20 feet : 200 feet } :: 16 days : 90 days, Ans.  
6 feet : 16 feet }  
4 feet : 6 feet }

$$\frac{6 \times 9 \times \overset{10}{200} \times \overset{4}{16} \times 6 \times \overset{4}{16}}{\underset{4}{24} \times 16 \times 20 \times 6 \times 4} = 90 \text{ days.}$$

(11.)

15 days : 20 days }  
9 hours : 12 hours } :: 117 miles : 208 miles, Ans.

$$\frac{20 \times \overset{4}{12} \times \overset{4}{117}}{\overset{13}{15} \times 9} = 208 \text{ miles.}$$

(12.)

30 men : 12 men }  
30 feet : 300 feet }  
6 feet : 8 feet } :: 15 days : 240 days, Ans.  
3 feet : 6 feet }  
8 hours : 12 hours }

$$\frac{12 \times \overset{4}{300} \times \overset{2}{8} \times \overset{4}{6} \times \overset{4}{12} \times 15}{\underset{3}{30} \times \underset{3}{30} \times 6 \times 3 \times \underset{2}{8}} = 240 \text{ days.}$$

(13.)

$$\begin{array}{l} 644\text{lb.} : 865\text{lb.} \\ 150\text{ miles} : 32\text{ miles} \end{array} \left. \vphantom{\begin{array}{l} 644\text{lb.} : 865\text{lb.} \\ 150\text{ miles} : 32\text{ miles} \end{array}} \right\} :: \$ 24.58 : \$ 7.04 + \text{Ans.}$$

$$\begin{array}{r} 173 \quad 4 \\ 865 \times 32 \times 24.58 \\ \hline 644 \times 150 \\ 161 \quad 75 \\ 15 \end{array} = \frac{17000.36}{2415} = \$ 7.04 +.$$

(14.)

$$\begin{array}{l} \$ 1800 : \$ 600 \\ \$ 9 : \$ 9 \end{array} \left. \vphantom{\begin{array}{l} \$ 1800 : \$ 600 \\ \$ 9 : \$ 9 \end{array}} \right\} :: 6\text{ months} : 2\text{ months, Ans.}$$

$$\begin{array}{r} 2 \\ 600 \times 9 \times 6 \\ \hline 1800 \times 9 \\ 3 \end{array} = 2\text{ months.}$$

(15.)

$$\begin{array}{l} 20\text{ cows} : 28\text{ cows} \\ 8\text{ weeks} : 12\text{ weeks} \end{array} \left. \vphantom{\begin{array}{l} 20\text{ cows} : 28\text{ cows} \\ 8\text{ weeks} : 12\text{ weeks} \end{array}} \right\} :: 3\text{ tons} : 6\frac{3}{10}\text{ tons, Ans.}$$

$$\begin{array}{r} 7 \quad 3 \\ 28 \times 12 \times 3 \\ \hline 20 \times 8 \\ 5 \quad 2 \end{array} = \frac{1008}{160} = 6\frac{3}{10}\text{ tons.}$$

(16.)

$$\begin{array}{l} 12\frac{1}{11}\text{ men} : 5\text{ men} \\ 30\text{ acres} : 54\text{ acres} \end{array} \left. \vphantom{\begin{array}{l} 12\frac{1}{11}\text{ men} : 5\text{ men} \\ 30\text{ acres} : 54\text{ acres} \end{array}} \right\} :: 10\text{ days} : 7\frac{31}{137}\text{ days, Ans.}$$

$$\begin{array}{r} 18 \\ 5 \times 54 \times 10 \\ \hline 121 \times 30 \\ 3 \end{array} = \frac{90}{121} = \frac{90}{121} \times \frac{11}{11} = \frac{99}{137} = 7\frac{31}{137}\text{ days.}$$

(17.)

$$\begin{array}{l} 18\text{ men} : 2\text{ men} \\ 12\frac{3}{4}\text{ rods} : 247\frac{2}{3}\text{ rods} \end{array} \left. \vphantom{\begin{array}{l} 18\text{ men} : 2\text{ men} \\ 12\frac{3}{4}\text{ rods} : 247\frac{2}{3}\text{ rods} \end{array}} \right\} :: 6\frac{1}{2}\text{ days} : 14\text{ days, Ans.}$$

$$\begin{array}{r} 7 \\ 63 \\ 2 \times \frac{3213}{13} \times \frac{13}{2} \\ \hline 18 \times \frac{51}{4} \\ 2 \quad 2 \end{array} = 14\text{ days.}$$

$$\begin{array}{l}
 24 \text{ men} : 248 \text{ men} \\
 9 \text{ hours} : 11 \text{ hours} \\
 7 \text{ hard.} : 4 \text{ hard.} \\
 232\frac{1}{2} \text{ feet} : 337\frac{1}{2} \text{ feet} \\
 3\frac{2}{3} \text{ feet} : 5\frac{2}{3} \text{ feet} \\
 2\frac{1}{2} \text{ feet} : 3\frac{1}{2} \text{ feet}
 \end{array}
 \left. \vphantom{\begin{array}{l} 24 \text{ men} : 248 \text{ men} \\ 9 \text{ hours} : 11 \text{ hours} \\ 7 \text{ hard.} : 4 \text{ hard.} \\ 232\frac{1}{2} \text{ feet} : 337\frac{1}{2} \text{ feet} \\ 3\frac{2}{3} \text{ feet} : 5\frac{2}{3} \text{ feet} \\ 2\frac{1}{2} \text{ feet} : 3\frac{1}{2} \text{ feet} \end{array}} \right\} (18.) : : 5\frac{1}{2} \text{ days} : 132 \text{ days, Ans.}$$

$$\begin{array}{r}
 31 \\
 248 \times 11 \times 4 \times \frac{675}{2} \times \frac{28}{5} \times \frac{7}{2} \times \frac{11}{2} \\
 \hline
 24 \times 9 \times 7 \times \frac{465}{2} \times \frac{11}{3} \times \frac{7}{3} = 132 \text{ days.}
 \end{array}$$

PARTNERSHIP, OR COMPANY BUSINESS.

(ART. 252, p. 249.)

$$\begin{array}{l}
 \text{(2.)} \\
 \text{A's stock, \$ 6000} \quad \frac{6000}{20000} = \frac{3}{10}, \text{ A's fractional part.} \\
 \text{B's stock, \$ 9000} \quad \frac{9000}{20000} = \frac{9}{20}, \text{ B's fractional part.} \\
 \text{C's stock, \$ 5000} \quad \frac{5000}{20000} = \frac{1}{4}, \text{ C's fractional part.} \\
 \hline
 \begin{array}{r}
 \$ 840 \\
 3 \\
 \hline
 10)2520
 \end{array}
 \quad
 \begin{array}{r}
 \$ 20000 \\
 9 \\
 \hline
 20)7560
 \end{array}
 \quad
 \begin{array}{r}
 \$ 840 \\
 1 \\
 \hline
 4)840
 \end{array}$$

\$252, A's gain.      \$378, B's gain.      \$210, C's gain.

$$\begin{array}{l}
 \text{(3.)} \\
 \text{Parker, \$ 8750} \quad \frac{8750}{6875} = \frac{5}{4}, \text{ Parker's part.} \\
 \text{Dole, \$ 3610} \quad \frac{3610}{6875} = \frac{361}{687.5}, \text{ Dole's part.} \\
 \text{Gage, \$ 7000} \quad \frac{7000}{6875} = \frac{700}{687.5}, \text{ Gage's part.} \\
 \hline
 \$ 19360
 \end{array}$$

$$\begin{array}{l}
 \$ 6500 \times 875 \\
 1936 \\
 \hline
 = \$ 2937.75\frac{125}{128} = \text{Parker's dividend.} \\
 \$ 6500 \times 361 \\
 1936 \\
 \hline
 = \$ 1212.03\frac{82}{128} = \text{Dole's dividend.} \\
 \$ 6500 \times 700 \\
 1936 \\
 \hline
 = \$ 2350.20\frac{80}{128} = \text{Gage's dividend.}
 \end{array}$$

(4.)

A's debt \$ 500  $\frac{500}{2000} = \frac{1}{4}$ , A's fractional part.B's debt \$ 386  $\frac{386}{2000} = \frac{193}{1000}$ , B's fractional part.C's debt \$ 988  $\frac{988}{2000} = \frac{247}{500}$ , C's fractional part.D's debt \$ 126  $\frac{126}{2000} = \frac{63}{1000}$ , D's fractional part.\$ 2000

$$\frac{\$ 100 \times 1}{4} = \$ 25.00, \text{ A's part.} \quad \left| \quad \frac{\$ 100 \times 247}{500} = \$ 49.40, \text{ C's part.} \right.$$

$$\frac{\$ 100 \times 193}{1000} = \$ 19.30, \text{ B's part.} \quad \left| \quad \frac{\$ 100 \times 63}{1000} = \$ 6.30, \text{ D's part.} \right.$$

(5.)

The whole gain is \$ 90; but C's gain is \$ 30; A and B's gain, therefore, is \$ 90 — \$ 30 = \$ 60; A's stock being \$ 700, his share of the gain will be  $\frac{700}{1000} = \frac{7}{10}$  of \$ 60 = \$ 42. B's stock being \$ 300, his share of the gain will be  $\frac{300}{1000} = \frac{3}{10}$  of \$ 60 = \$ 18. As the stock of each person in the firm bears the same proportion to his gain as the other, and as A's gain is \$ 42, and his stock \$ 700, therefore, \$ 42 A's gain : \$ 700 A's stock :: \$ 30 C's gain : \$ 500 C's stock. Then \$ 500 ÷ 100 = \$ 5.00, value of C's flour per barrel.

## STATEMENT.

$$\begin{aligned} \$ 1000 : \$ 60 :: \$ 700 : \$ 42, \text{ A's gain, } \} \\ \$ 1000 : \$ 60 :: \$ 300 : \$ 18, \text{ B's gain, } \} \text{ Ans.} \end{aligned}$$

$$\$ 42 : \$ 700 :: \$ 30 : \$ 500, \text{ C's stock.}$$

$$\$ 500 \div 100 = \$ 5.00, \text{ value of C's flour per barrel, Ans.}$$

(ART. 253, p. 250.)

(2.)

$$\$ 700 \times 5 = 3500 \quad \frac{3500}{13300} = \frac{35}{133}, \text{ A's fraction.}$$

$$\$ 800 \times 6 = 4800 \quad \frac{4800}{13300} = \frac{48}{133}, \text{ B's fraction.}$$

$$\$ 500 \times 10 = 5000 \quad \frac{5000}{13300} = \frac{50}{133}, \text{ C's fraction.}$$
\$ 13300

$$\frac{\$ 399 \times 35}{133} = \$ 105, \text{ A's gain.}$$

$$\frac{\$ 399 \times 48}{133} = \$ 144, \text{ B's gain.}$$

$$\frac{\$ 399 \times 50}{133} = \$ 150, \text{ C's gain.}$$

(3.)

Johnson's stock, \$ 1000  $\times$  6 = 6000500 $\frac{111111}{431} = 111, \text{ Johnson.}$ \$ 1500  $\times$  6 = 9000\$ 15000Hyde's stock, \$ 800  $\times$  4 = 3200400\$ 1200  $\times$  6 = 7200 $\frac{111111}{431} = 111, \text{ Hyde.}$ 500\$ 700  $\times$  2 = 1400\$ 11800Tyler's stock, \$ 1200  $\times$  7 = 8400300 $\frac{111111}{431} = 111, \text{ Tyler.}$ \$ 1500  $\times$  3 = 4500

\$ 15000

200

11800

\$ 1700  $\times$  2 = 340016300

\$ 16300

\$ 43100

 $\frac{\$ 1000 \times 150}{431} = \$ 348.02 \frac{22}{431}, \text{ Johnson's gain.}$  $\frac{\$ 1000 \times 118}{431} = \$ 273.78 \frac{32}{431}, \text{ Hyde's gain.}$  $\frac{\$ 1000 \times 163}{431} = \$ 378.19 \frac{11}{431}, \text{ Tyler's gain.}$ 

(4.)

The stock in trade is a horse and chaise to ride to Newburyport and back; the whole distance being 30 miles. The expense for the horse and chaise may be considered the "loss"; and the proportional part which each rode, the "time." Now, by the rule, each man is to bear his share of the loss (expense) in proportion as he has the use of the stock in trade (horse and chaise). Morse had the use of the whole stock in trade for the first 4 and last 4 miles, for which he must pay  $\frac{8}{30} = \frac{4}{15}$  of \$ 3.00 = \$ 0.80. For the remaining part of the distance, 22 miles, the expense was  $\frac{22}{8} = \frac{11}{4}$  of \$ 3.00 =

\$2.20. Of this sum, Jones and Morse will pay equal parts =  
 $\$2.20 \div 2 = \$1.10$ . Morse will therefore pay \$0.80 +  
 $\$1.10 = \$1.90$ , and Jones \$1.10.

$$\frac{4}{15} + \frac{11}{15} \times \frac{1}{2} = \frac{18}{30}, \text{ Morse's product.}$$

$$\frac{11}{15} \times \frac{1}{2} = \frac{11}{30}, \text{ Jones's product.}$$

$\frac{18}{30}$ , sum of the products.

$$\frac{18}{30} : \frac{11}{30} :: \$3.00$$

19

2700

300

30)5700(\$1.90 = Morse's share of the expense.

30

270

270

0

$$\frac{18}{30} : \frac{11}{30} :: \$3.00$$

11

30)3300(\$1.10 = Jones's share of the expense.

30

30

30

0

(5.)

As Jones's capital was invested 12 months and Cotton's but 9 months, Cotton's capital must be  $\frac{1}{2}$  of Jones's capital.

9 months : 12 months :: \$1000 : \$1333.33 $\frac{1}{3}$  Ans.

(6.)

\$96  $\div$  8 = \$12, S's gain in 1 mo.  $\frac{1}{4}$  = S's share of stock.

\$90  $\div$  6 = \$15, C's gain in 1 mo.  $\frac{1}{4}$  = C's share.

\$80  $\div$  4 = \$20, D's gain in 1 mo.  $\frac{2}{7}$  = D's share.

\$47 whole gain.

$$\begin{array}{l} \$4700 \times \frac{1}{4} = \$1200, \text{ S's stock,} \\ \$4700 \times \frac{1}{4} = \$1500, \text{ C's stock,} \\ \$4700 \times \frac{2}{7} = \$2000, \text{ D's stock,} \end{array} \left. \vphantom{\begin{array}{l} \\ \\ \end{array}} \right\} \text{Ans.}$$

(7.)

$$\$ 4000 \times 5 = \$ 20000 \quad \frac{20000}{100000} = \frac{1}{5}, \text{ P's share of the gain.}$$

$$\$ 6000 \times 8 = \$ 48000 \quad \frac{48000}{100000} = \frac{12}{25}, \text{ H's share.}$$

$$\$ 68000$$

$$\begin{aligned} \$ 680 \times \frac{1}{5} &= \$ 200, \text{ P's gain,} \\ \$ 680 \times \frac{12}{25} &= \$ 480, \text{ H's gain,} \end{aligned} \quad \left. \vphantom{\begin{aligned} \$ 680 \times \frac{1}{5} &= \$ 200, \\ \$ 680 \times \frac{12}{25} &= \$ 480, \end{aligned}} \right\} \text{Ans.}$$

(8.)

$$\$ 300 \times 7 = \$ 2100 \quad \frac{2100}{10000} = \frac{21}{1000}, \text{ A's part.}$$

$$\$ 500 \times 8 = \$ 4000 \quad \frac{4000}{10000} = \frac{4}{1000}, \text{ B's part.}$$

$$\$ 200 \times 12 = \$ 2400 \quad \frac{2400}{10000} = \frac{24}{1000}, \text{ C's part.}$$

$$\$ 8500$$

$$\begin{aligned} \$ 85 \times \frac{21}{1000} &= \$ 21, \text{ A's gain,} \\ \$ 85 \times \frac{4}{1000} &= \$ 40, \text{ B's gain,} \\ \$ 85 \times \frac{24}{1000} &= \$ 24, \text{ C's gain,} \end{aligned} \quad \left. \vphantom{\begin{aligned} \$ 85 \times \frac{21}{1000} &= \$ 21, \\ \$ 85 \times \frac{4}{1000} &= \$ 40, \\ \$ 85 \times \frac{24}{1000} &= \$ 24, \end{aligned}} \right\} \text{Ans.}$$

(9.)

$$\$ 10 \div 5 = \$ 2, \text{ A's gain in 1 mo.} \quad \frac{2}{5} = \text{A's part of stock.}$$

$$\$ 12 \div 4 = \$ 3, \text{ B's gain in 1 mo.} \quad \frac{3}{5} = \text{B's part.}$$

$$\$ 5$$

$$\begin{aligned} \$ 500 \times \frac{2}{5} &= \$ 200, \text{ A's stock,} \\ \$ 500 \times \frac{3}{5} &= \$ 300, \text{ B's stock,} \end{aligned} \quad \left. \vphantom{\begin{aligned} \$ 500 \times \frac{2}{5} &= \$ 200, \\ \$ 500 \times \frac{3}{5} &= \$ 300, \end{aligned}} \right\} \text{Ans.}$$

(10.)

$$\$ 3000 \times 6 = \$ 18000 \quad \$ 6000 \times 8 = \$ 48000$$

$$\$ 2000$$

$$\$ 3000$$

$$\$ 5000 \times 6 = \$ 30000 \quad \$ 3000 \times 4 = \$ 12000$$

$$\$ 48000, \text{ A.}$$

$$\$ 60000, \text{ B.}$$

$$\$ 48000$$

$$\frac{48000}{100000} = \frac{48}{1000}, \text{ A's share.}$$

$$60000$$

$$\frac{60000}{100000} = \frac{60}{1000}, \text{ B's share.}$$

$$\$ 108000$$

$$\begin{aligned} \$ 1080 \times \frac{48}{1000} &= \$ 480, \text{ A's gain,} \\ \$ 1080 \times \frac{60}{1000} &= \$ 600, \text{ B's gain,} \end{aligned} \quad \left. \vphantom{\begin{aligned} \$ 1080 \times \frac{48}{1000} &= \$ 480, \\ \$ 1080 \times \frac{60}{1000} &= \$ 600, \end{aligned}} \right\} \text{Ans.}$$



$$\begin{array}{rcl}
 5 \times 4 = 20 & (11.) & \frac{20}{150} = \frac{2}{15}, A. \\
 6 \times 8 = 48 & & \frac{48}{150} = \frac{8}{25}, B. \\
 8 \times 5 = 40 & & \frac{40}{150} = \frac{4}{15}, C. \\
 3 \times 14 = \underline{42} & & \frac{42}{150} = \frac{7}{25}, D. \\
 150 & &
 \end{array}$$

$$\left. \begin{array}{l}
 \$ 50 \times \frac{2}{15} = \$ 6.66\frac{2}{3}, \text{ A's share,} \\
 \$ 50 \times \frac{8}{25} = \$ 16.00, \text{ B's share,} \\
 \$ 50 \times \frac{4}{15} = \$ 13.33\frac{1}{3}, \text{ C's share,} \\
 \$ 50 \times \frac{7}{25} = \$ 14.00, \text{ D's share,}
 \end{array} \right\} \text{Ans.}$$

$$\begin{array}{rcl}
 30 \times 50 = 1500 & (12.) & \frac{1500}{5910} = \frac{50}{197}, A. \\
 50 \times 36 = 1800 & & \frac{1800}{5910} = \frac{60}{197}, B. \\
 58 \times 45 = \underline{2610} & & \frac{2610}{5910} = \frac{87}{197}, C. \\
 5910 & &
 \end{array}$$

$$\$ 7500 - \$ 112.50 = \$ 7387.50.$$

$$\left. \begin{array}{l}
 \$ 7387.50 \times \frac{50}{197} = \$ 1875, \text{ A receives,} \\
 \$ 7387.50 \times \frac{60}{197} = \$ 2250, \text{ B receives,} \\
 \$ 7387.50 \times \frac{87}{197} = \$ 3262.50 + \$ 112.50 = \$ 3375, \text{ C}
 \end{array} \right\} \text{Ans. [receives,]}$$

### PROFIT AND LOSS.

3. (ART. 255, p. 253.)  $\$ 5.40 \times 40 = \$ 216$ , price paid;  
 $40 \times \frac{3}{4} = 30$ ;  $\$ 6.00 \times 30 = \$ 180$ ;  $40 \times \frac{1}{4} = 10$ ;  
 $\$ 7 \times 10 = \$ 70$ ;  $\$ 180 + \$ 70 = \$ 250$ , price sold at;  
 $\$ 216 : \$ 250 :: \$ 100 : \$ 115\frac{2}{3}$ ;  $\$ 115\frac{2}{3} - \$ 100$   
 $= \$ 15\frac{2}{3} = 15\frac{2}{3}$  per cent., Ans.
4.  $\$ 5 \times 50 = \$ 250$ , price paid;  $\$ 5.98 + 1.04 = \$ 5.75$ ,  
present worth of  $\$ 5.98$  due 8 months hence;  $\$ 5.75 \times$   
 $50 = \$ 287.50$ , price sold at;  $\$ 250 : \$ 287.50 :: \$ 100$   
 $: \$ 115$ ;  $\$ 115 - \$ 100 = \$ 15 = 15$  per cent., Ans.
5.  $100 \times \$ 0.30 = \$ 30$ , price paid;  $100 - 30 = 70$ ;  $70 \times$   
 $\$ 0.40 = \$ 28$ , price sold at;  $\$ 30 : \$ 28 :: \$ 100 :$   
 $\$ 93\frac{1}{3}$ ;  $\$ 100 - \$ 93\frac{1}{3} = \$ 6\frac{2}{3} = 6\frac{2}{3}$  per cent., Ans.

6.  $3000 \times \$1.12\frac{1}{2} = \$3375$ , price paid;  $3000 \times \$0.05 = \$150$ , cost of transportation;  $\$3375 + \$150 = \$3525$ , whole cost;  $3000 \times \$1.37\frac{1}{2} = \$4125$ , price sold at;  $\$3525 : \$4125 :: \$100 : \$117\frac{1}{4}$ ;  $\$117\frac{1}{4} - \$100 = \$17\frac{1}{4} = 17\frac{1}{4}$  per cent., Ans.

7.  $7\frac{3}{4}$ rd. =  $1\frac{1}{4}$ rd.;  $\frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$ rd., contents of the lot;  
 $\frac{\$400}{121} \times \$5 = \$\frac{2000}{121}$ , price paid;  $\frac{1600}{121}$ rd.  $\times \frac{9}{4} = \frac{3600}{121}$ rd. = 14400ft.;  $14400 \times \$0.05 = \$720 = \frac{\$7120}{121}$ ;  $\frac{2000}{121} : \frac{\$7120}{121} :: \$100 : \$272\frac{1}{2}$ ;  $\$272\frac{1}{2} - \$100 = \$172\frac{1}{2} = 172\frac{1}{2}$  per cent., Ans.

3. (ART. 256, p. 254.)  $120 \times \$0.30 = \$36.00$ , price paid;  $\$100 : \$90 :: \$36.00 : \$32.40$  Ans.  
 4. 7cwt. 3qr. 12lb. = 880lb.;  $\$100 : \$120 :: \$88 : \$105.60$ ,  $\$105.60 \div 880 = \$0.12$  per pound, Ans.  
 5.  $\$100 : \$112 :: \$1728 : \$1935.36$ ;  $\$1935.36 \times 1.04 = \$2012.77+$ , worth of  $\$1935.36$ , 8 months hence, Ans.  
 6.  $\$100 : \$110 :: \$4.00 : \$4.40$ , price sold at; 32gal. — 8gal. = 24gal.;  $\$4.40 \div 24 = \$0.18\frac{1}{3}$ , price per galon, Ans.  
 7.  $\$90 \div 1.03 = \$87.37+$ , present worth of  $\$90$ , due 6 months hence;  $\$100 : \$120 :: \$87.37+ : \$104.84+$ , Ans.  
 8.  $\$11.50 \times 7 = \$80.50$ ;  $\$100 : \$85 :: \$80.50 : \$68.42+$ , Ans.

3. (ART. 257, p. 255.)  $\$100 - \$62.50 = \$37.50$ ;  $\$37.50 : \$100 :: \$80 : \$213.33\frac{1}{3}$ , Ans.  
 4.  $\$100 + \$20 = \$120$ ;  $\$120 : \$100 :: \$7.20 : \$6.00$  per cord, Ans.  
 5.  $\$100 + \$18 = \$118$ ;  $\$118 : \$100 :: \$1600.00 : \$1355.93+$ , Ans.  
 6.  $\$8 \times 17 = \$136$ ;  $\$136 \times .0155 = \$2.10,8$ , discount of  $\$136$  for 3 months;  $\$136 - \$2.10,8 = \$133.89+$

present worth of \$136, due 3 months hence; \$100 — \$10 = \$90; \$90 : \$900 :: \$133.89+ : \$148.76+,  
Ans.

2. (ART. 258, p. 256.) \$100 + \$12 = \$112; \$112 : \$100 :: \$0.28 : \$0.25; \$0.25 : \$0.24 :: \$100 : \$96;  
\$100 — \$96 = \$4 = 4 per cent. loss, Ans.
3. \$100 — \$25 = \$75; \$37.50 : \$75 :: \$75 : \$150;  
\$150 — \$100 = \$50 = 50 per cent. gain, Ans.
4. \$1728 ÷ 1.045 = \$1653.58+, present worth of \$1728,  
due 9 months hence; \$1653.58+ : \$2000 :: \$110 : \$133+;  
\$133+ — \$100 = \$33+ = 33+ per cent. gain, Ans.

#### MISCELLANEOUS EXERCISES.

1. (p. 257.) \$84.00 : \$75.60 :: \$100 : \$90; \$100 — \$90 = \$10 = 10 per cent. loss, Ans.
2. \$100 — \$10 = \$90; \$75.60 : \$97.44 :: \$90 : \$116;  
\$116 — \$100 = \$16 = 16 per cent. loss, Ans.
3. \$100 + \$16 = \$116; \$97.44 : \$75.60 :: \$116 : \$90;  
\$100 — \$90 = \$10 = 10 per cent. loss, Ans. \$116 : \$100 :: \$97.44 : \$84, real value of the horse; \$84 — \$75.60 = \$8.40, actual loss, Ans.
4. \$5 ÷ \$1.045 = \$4.78+, present worth of \$5, due 9 months hence; \$100 + \$12 = \$112; \$100 : \$112 :: \$4.78+ : \$5.35+, Ans.
5. \$100 + \$10 = \$110; \$100 : \$110 :: \$40 : \$44, price sold at; 120gal. — 20gal. = 100gal.; \$44.00 ÷ 100 = \$0.44 per gallon, Ans.
6. \$5 : \$7.50 :: \$100 : \$150; \$150 — \$100 = \$50 = 50 per cent., Jones's gain; \$0.10 : \$0.14 :: \$100 : \$140; \$140 — \$100 = \$40 = 40 per cent., Crosby's gain; 50 — 40 = 10 per cent., Jones's gain more than Crosby's, Ans.
7. \$0.30 × 40 = \$12.00; 30 cents on the dollar =  $\frac{30}{100}$  of the sum to be paid; \$12.00 ×  $\frac{30}{100}$  = \$3.60, price

received for 40gal. ; 160gal. — 40gal. = 120gal. ;  
 $\$0.35 \times 120 = \$42.00$ , price received for 120gal. ;  
 $\$42.00 + \$3.60 = \$45.60$ ; price received for 160gal. ;  
 $\$100 + \$10 = \$110$  ;  $\$110 : \$100 :: 45.60 :$   
 $\$41.45+$ , Ans.

8.  $\$100 - \$10 = \$90$  ;  $\$90 : \$100 :: \$75.60 : \$84.00$ ,  
 real value of the horse ;  $\$100 + \$16 = \$116$  ;  
 $\$100 : \$116 :: \$84 : \$97.44$ , received for the horse ;  
 $\$75.60 : \$97.44 :: \$100 : \$128\frac{2}{3}$  ;  $\$128\frac{2}{3} - \$100$   
 $= \$28\frac{2}{3} = 28\frac{2}{3}$  per cent. gained, Ans.

9.  $1\frac{1}{2}$ yd. = 1.75 ; 5 per cent. =  $\frac{1}{20}$  ;  $1\frac{1}{2} - \frac{1}{20} = \frac{14}{10}$  ;  
 $1.75 \text{ yd.} \times \frac{14}{10} = 1.6625 \text{ yd.}$ , width after shrinking ;  
 $70 \text{ yd.} \times \frac{14}{10} = 66.5 \text{ yd.}$ , length after shrinking ;  $66.5 \text{ yd.} \times$   
 $1.6625 = 110.55+$  square yards after shrinking ;  $\$4.50$   
 $\times 70 = \$315.00$ , price paid ;  $\$100 + \$12 = \$112$  ;  
 $\$100 : \$112 :: \$315.00 : \$352.80$ , price sold at ;  
 $\$352.80 \div 110.55+ = \$3.19+$ , price per sq. yd., Ans.

# DUODECIMALS.

(ART. 260, p. 258.)

| (1.)                                                                                                                                                          | (2.)                                                                                                                                                                                                        | (3.)                                                                                                                                   | (4.)                                                                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\begin{array}{r} \text{ft.} \quad ' \quad '' \\ 12 \quad 6 \quad 9 \\ 14 \quad 7 \quad 8 \\ 165 \quad 11 \quad 10 \\ \hline 193 \quad 2 \quad 3 \end{array}$ | $\begin{array}{r} \text{ft.} \quad ' \quad '' \quad '' \\ 182 \quad 11 \quad 2 \quad 4 \\ 127 \quad 7 \quad 8 \quad 11 \\ 291 \quad 5 \quad 11 \quad 10 \\ \hline 602 \quad 0 \quad 11 \quad 1 \end{array}$ | $\begin{array}{r} \text{ft.} \quad ' \quad '' \\ 204 \quad 7 \quad 9 \\ 114 \quad 10 \quad 6 \\ \hline 89 \quad 9 \quad 3 \end{array}$ | $\begin{array}{r} \text{ft.} \quad ' \quad '' \quad '' \quad '' \\ 397 \quad 9 \quad 6 \quad 11 \quad 7 \\ 201 \quad 11 \quad 7 \quad 8 \quad 10 \\ \hline 195 \quad 9 \quad 11 \quad 2 \quad 9 \end{array}$ |

(ART. 262, p. 260.)

| (2.)                                                                                                                                                | (3.)                                                                                                                                                    | (4.)                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\begin{array}{r} \text{ft.} \quad ' \\ 8 \quad 3 \\ 7 \quad 9 \\ \hline 57 \quad 9 \\ 6 \quad 2 \quad 3 \\ \hline 63 \quad 11 \quad 3 \end{array}$ | $\begin{array}{r} \text{ft.} \quad ' \\ 12 \quad 9 \\ 9 \quad 11 \\ \hline 114 \quad 9 \\ 11 \quad 8 \quad 3 \\ \hline 126 \quad 5 \quad 3 \end{array}$ | $\begin{array}{r} \text{ft.} \quad ' \quad '' \\ 14 \quad 9 \quad 11 \\ 6 \quad 11 \quad 8 \\ \hline 88 \quad 11 \quad 6 \\ 13 \quad 7 \quad 1 \quad 1 \\ \hline 9 \quad 10 \quad 7 \quad 4 \\ \hline 103 \quad 4 \quad 5 \quad 8 \quad 4 \end{array}$ |

$$\begin{array}{r}
 \text{(5.)} \\
 \begin{array}{r}
 \text{ft.} \quad \text{in.} \quad \text{ft.} \\
 161 \quad 8 \quad 6 \\
 \hline
 7 \quad 10 \\
 \hline
 1131 \quad 11 \quad 6 \\
 134 \quad 9 \quad 1 \\
 \hline
 1266 \quad 8 \quad 7
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(6.)} \\
 \begin{array}{r}
 \text{ft.} \quad \text{in.} \quad \text{ft.} \\
 87 \quad 1 \quad 11 \\
 \hline
 5 \quad 7 \quad 5 \\
 \hline
 435 \quad 9 \quad 7 \\
 50 \quad 10 \quad 1 \quad 5 \\
 \hline
 3 \quad 0 \quad 3 \quad 9 \quad 7 \\
 \hline
 489 \quad 8 \quad 0 \quad 2 \quad 7
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(7.)} \\
 \begin{array}{r}
 \text{ft.} \\
 18 \\
 \hline
 1 \quad 10 \\
 \hline
 18 \\
 15 \quad 0 \\
 \hline
 33 \quad 0
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(8.)} \\
 \begin{array}{r}
 \text{ft.} \quad \text{in.} \\
 19 \quad 8 \\
 \hline
 2 \quad 11 \\
 \hline
 39 \quad 4 \\
 18 \quad 0 \quad 4 \\
 \hline
 57 \quad 4 \quad 4
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(9.)} \\
 \begin{array}{r}
 \text{ft.} \quad \text{in.} \\
 18 \quad 9 \\
 \hline
 10 \quad 6 \\
 \hline
 187 \quad 6 \\
 9 \quad 4 \quad 6 \\
 \hline
 196 \quad 10 \quad 6
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(10.)} \\
 \begin{array}{r}
 \text{ft.} \quad \text{in.} \\
 14 \quad 9 \\
 \hline
 12 \quad 6 \\
 \hline
 27 \quad 3 \\
 \hline
 2 \\
 \hline
 54 \quad 6 \\
 7 \quad 9 \\
 \hline
 381 \quad 6 \\
 40 \quad 10 \quad 6 \\
 \hline
 422 \quad 4 \quad 6 \\
 \hline
 14 \quad 9 \\
 \hline
 12 \quad 6 \\
 \hline
 177 \quad 0 \\
 7 \quad 4 \quad 6 \\
 \hline
 184 \quad 4 \quad 6 \\
 \hline
 2 \\
 \hline
 368 \quad 9 \quad 0 \\
 422 \quad 4 \quad 6 \\
 \hline
 791 \quad 1 \quad 6 \\
 \hline
 \text{[Ans.]}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{ft.} \quad \text{in.} \\
 3 \quad 8 \\
 \hline
 1 \quad 9 \\
 \hline
 3 \quad 8 \\
 2 \quad 9 \\
 \hline
 6 \quad 5 \\
 2 \\
 \hline
 12 \quad 10 \\
 7 \quad 4 \\
 3 \quad 2 \\
 \hline
 23 \quad 4 \\
 12 \\
 \hline
 280 \quad 0 \quad \text{Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{(11.)} \\
 \begin{array}{r}
 \text{ft.} \quad \text{in.} \\
 1 \quad 2 \\
 \hline
 2 \\
 \hline
 1 \quad 0 \\
 3 \quad 8 \\
 \hline
 3 \quad 0 \\
 8 \\
 \hline
 3 \quad 8 \\
 2 \\
 \hline
 7 \quad 4
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{ft.} \quad \text{in.} \\
 3 \quad 8 \\
 \hline
 2 \\
 \hline
 3 \quad 6 \\
 1 \quad 7 \\
 \hline
 3 \quad 6 \\
 2 \quad 0 \quad 6 \\
 \hline
 5 \quad 6 \quad 6 \\
 1 \quad 0 \\
 \hline
 5 \quad 6 \quad 6 \\
 12 \\
 \hline
 66 \quad 6 \quad 0 = \\
 \hline
 \text{[66ft. 864in.]}
 \end{array}$$

|                                 |                              |                                    |                                  |
|---------------------------------|------------------------------|------------------------------------|----------------------------------|
| (12.)                           |                              | (13.)                              |                                  |
| rods.                           | ft.                          | ft.                                |                                  |
| 18                              | 924                          | 56                                 |                                  |
| 10                              | $3\frac{1}{2} \times 4 = 14$ | 5                                  | 6                                |
| 28                              | 938                          | 280                                |                                  |
| 2                               | 4                            | 28                                 |                                  |
| 56                              | 3752                         | 32)308(9 $\frac{1}{2}$ cords, Ans. |                                  |
| 16 $\frac{1}{2}$                | 3 $\frac{1}{2}$              | 288                                |                                  |
| 336                             | 11256                        | 20                                 |                                  |
| 56                              | 1876                         |                                    |                                  |
| 28                              | 13132                        | (14.)                              |                                  |
| 924                             | 5592                         | ft. in.                            |                                  |
| $4 \times 2 = 8$                | Ans. 7540                    | 23 8                               |                                  |
| 932                             |                              | 3 9                                |                                  |
| 3                               |                              | 71 0                               |                                  |
|                                 |                              | 17 9                               |                                  |
| 2796                            | (15.)                        | 32)88                              | 9(2 $\frac{22}{128}$ cords, Ans. |
| 2                               | ft.                          | 12 64                              |                                  |
| 5592                            | 97                           | 384 24                             |                                  |
|                                 | 7                            | 12                                 |                                  |
|                                 | 679                          | 297                                |                                  |
|                                 | 3 8                          | 3) = $\frac{22}{128}$              |                                  |
|                                 | 2037                         | 384                                |                                  |
|                                 | 452 8                        |                                    |                                  |
|                                 | 128)2489                     |                                    |                                  |
|                                 | 128                          |                                    |                                  |
|                                 | 1209                         | (17.)                              |                                  |
|                                 | 1152                         | ft. ft. in. ft. in. ft.            |                                  |
|                                 | 16)57(3                      | 12 6 6 5 6 12                      |                                  |
|                                 | 12 48                        | 11 2 6 3 6 11                      |                                  |
|                                 | 192 9                        | 23 13 0 16 6 23                    |                                  |
| (16.)                           | 12                           | 2 3 3 2 9 2                        |                                  |
| ft. in.                         | 116 = $4\frac{1}{2}$         | 46 16 3 19 3 46                    |                                  |
| 3 9                             | 192                          | 7 $\frac{1}{2}$ 2 3 5              |                                  |
| 8                               |                              | 322 32 6 57 9 41 0                 |                                  |
| 30 0                            |                              | 23 32 6 32 6 8                     |                                  |
| 30)128(4 $\frac{1}{3}$ ft. Ans. |                              | 9)345 27 4 27 4                    |                                  |
| 120                             |                              | 38 $\frac{1}{2}$                   |                                  |
| 8                               |                              | 13 $\frac{7}{16}$                  |                                  |
|                                 |                              | 13 $\frac{7}{16}$                  |                                  |
|                                 |                              | 25 $\frac{22}{16}$ yd. Ans.        |                                  |

## INVOLUTION.

(ART. 264, p. 262.)

1.  $6 \times 6 = 36$  Ans.  
 2.  $5 \times 5 \times 5 = 125$  Ans. [Ans.  
 3.  $4 \times 4 \times 4 \times 4 \times 4 \times 4 = 4096$   
 4.  $3 \times 3 \times 3 \times 3 = 81$  Ans.  
 5.  $\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} = \frac{8}{27}$  Ans.

6.  $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16}$  Ans.  
 7.  $\frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} = \frac{1}{243}$  Ans.  
 8.  $.25 \times .25 \times .25 = .015625$   
 9. 17. Ans. [Ans.

2. (ART. 265, p. 263.)  $5, 25, 125; 125 \times 25 \times 25 = 78125$   
 3. 6, 36, 216;  $216 \times 216 \times 216 = 10077696$  Ans. [Ans.  
 4. 7, 49, 343, 2401;  $2401 \times 343 \times 343 \times 49 = 13841287201$   
 5. 8, 64, 512;  $512 \times 512 \times 64 = 16777216$  Ans. [Ans.  
 6. 4, 16, 64, 256, 1024;  $1024 \times 1024 = 1048576 \times 1048576 = 1099511627776$  Ans. •  
 7. 3, 9, 27, 81, 243, 729, 2187, 6561, 19683, 59049;  $59049 \times 59049 \times 59049 = 205891132094649$  Ans.  
 8. 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024;  $1024 \times 1024 \times 1024 \times 1024 \times 1024 = 1125899906842624$  Ans.

## EXTRACTION OF THE SQUARE ROOT.

(ART. 268, p. 267.)

- (3.) (4.) (5.)  
 $\begin{array}{r} 516961(719 \\ 49 \\ \hline 141)269 \\ 141 \\ \hline 1429)12861 \\ 12861 \\ \hline \end{array}$ 
 $\begin{array}{r} 182329(427 \\ 16 \\ \hline 82)223 \\ 164 \\ \hline 847)5929 \\ 5929 \\ \hline \end{array}$ 
 $\begin{array}{r} 23804641(4879 \\ 16 \\ \hline 88)780 \\ 704 \\ \hline 967)7646 \\ 6769 \\ \hline 9749)87741 \\ 87741 \\ \hline \end{array}$

| (6.)                                                                                                                                         | (7.)                                                                                                                                                                            | (8.)                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| $\begin{array}{r} 10673289(3267 \\ 9 \\ \hline 62)167 \\ 124 \\ \hline 646)4332 \\ 3876 \\ \hline 6527)45689 \\ 45689 \end{array}$           | $\begin{array}{r} 20894041(4571 \\ 16 \\ \hline 85)489 \\ 425 \\ \hline 907)6440 \\ 6349 \\ \hline 9141)9141 \\ 9141 \end{array}$                                               | $\begin{array}{r} 42025(205 \\ 4 \\ \hline 405)2025 \\ 2025 \end{array}$                                                                            |
| (9.)                                                                                                                                         | (10.)                                                                                                                                                                           | (11.)                                                                                                                                               |
| $\begin{array}{r} 1014049(1007 \\ 1 \\ \hline 2007)014049 \\ 014049 \end{array}$                                                             | $\begin{array}{r} 538(23.194+ \\ 4 \\ \hline 43)138 \\ 129 \\ \hline 461)900 \\ 461 \\ \hline 4629)43900 \\ 41661 \\ \hline 46384)223900 \\ 185536 \\ \hline 38364 \end{array}$ | $\begin{array}{r} 71(8.426+ \\ 64 \\ \hline 164)700 \\ 656 \\ \hline 1682)4400 \\ 3364 \\ \hline 16846)103600 \\ 101076 \\ \hline 2524 \end{array}$ |
| (12.)                                                                                                                                        | (13.)                                                                                                                                                                           | (14.)                                                                                                                                               |
| $\begin{array}{r} 7(2.645+ \\ 4 \\ \hline 46)300 \\ 276 \\ \hline 524)2400 \\ 2096 \\ \hline 5285)30400 \\ 26425 \\ \hline 3975 \end{array}$ | $\begin{array}{r} .1024(.32 \\ 9 \\ \hline 62)124 \\ 124 \end{array}$                                                                                                           | $\begin{array}{r} .3364(.58 \\ 25 \\ \hline 108)864 \\ 864 \end{array}$                                                                             |
| (15.)                                                                                                                                        | (16.)                                                                                                                                                                           |                                                                                                                                                     |
| $\begin{array}{r} .8950(.946+ \\ 81 \\ \hline 184)850 \\ 736 \\ \hline 1886)11400 \\ 11316 \\ \hline 84 \end{array}$                         | $\begin{array}{r} .120409(.347 \\ 9 \\ \hline 64)304 \\ 256 \\ \hline 687)4809 \\ 4809 \end{array}$                                                                             |                                                                                                                                                     |



| (17.)                              |                                    | (18.)                              |                       |
|------------------------------------|------------------------------------|------------------------------------|-----------------------|
| 61723020.96(7856.4                 |                                    | 9754.60423716(98.7654              |                       |
| 49                                 |                                    | 81                                 |                       |
| 148)1272                           |                                    | 188)1654                           |                       |
| 1184                               |                                    | 1504                               |                       |
| 1565)8830                          |                                    | 1967)15060                         |                       |
| 7825                               |                                    | 13769                              |                       |
| 15706)100520                       |                                    | 19746)129142                       |                       |
| 94236                              |                                    | 118476                             |                       |
| 157124)628496                      |                                    | 197525)1066637                     |                       |
| 628496                             |                                    | 987625                             |                       |
|                                    |                                    | 1975304)7901216                    |                       |
|                                    |                                    | 7901216                            |                       |
| (ART. 269, p. 267.)                |                                    |                                    |                       |
| (1.)                               | (2.)                               | (3.)                               | (4.)                  |
| $\sqrt{529}$                       | $\sqrt{121}$                       | $\sqrt{3721}$                      | $\sqrt{1849}$         |
| 23                                 | 11                                 | 61                                 | 43                    |
| 49(7                               | 196(14                             | 3721(61                            | 1849(43               |
| 49                                 | 1                                  | 36                                 | 16                    |
|                                    | 24)96                              | 121)121                            | 83)249                |
|                                    | 96                                 | 121                                | 249                   |
| 529(23                             | 625(25                             | 7569(87                            | 12769(113             |
| 4                                  | 4                                  | 64                                 | 1                     |
| 43)129                             | 45)225                             | 167)1169                           | 21)27                 |
| 129                                | 225                                | 1169                               | 21                    |
| $\frac{7}{23}$ Ans.                | $\frac{15}{25}$ Ans.               | $\frac{61}{87}$ Ans.               | $\frac{43}{113}$ Ans. |
| (5.)                               | (6.)                               | (7.)                               |                       |
| $60\frac{1}{18} = 3\frac{1}{6}$    | $28\frac{1}{4} = 7\frac{1}{4}$     | $47\frac{1}{4} = 11\frac{3}{4}$    |                       |
| 961(31                             | 1849(43                            | 3025(55                            |                       |
| 9                                  | 16                                 | 25                                 |                       |
| 61)61                              | 83)249                             | 105)525                            |                       |
| 61                                 | 249                                | 525                                |                       |
| 16(4                               | 64(8                               | 64(8                               |                       |
| 16                                 | 64                                 | 64                                 |                       |
| $\frac{31}{4} = 7\frac{3}{4}$ Ans. | $\frac{43}{8} = 5\frac{3}{8}$ Ans. | $\frac{55}{8} = 6\frac{7}{8}$ Ans. |                       |

$$\begin{array}{r}
 \text{(8.)} \\
 4\frac{2}{3} = .736842 + (.858 + \\
 \quad \underline{64} \\
 \quad 165)968 \\
 \quad \quad \underline{825} \\
 1708)14342 \\
 \quad \quad \underline{13664} \\
 \quad \quad \quad 678
 \end{array}$$

$$\begin{array}{r}
 \text{(9.)} \\
 83\frac{1}{3} = 83.6666 + (9.14 + \\
 \quad \underline{81} \\
 \quad 181)266 \\
 \quad \quad \underline{181} \\
 1824)8566 \\
 \quad \quad \underline{7296} \\
 \quad \quad \quad 1270
 \end{array}$$

$$\begin{array}{r}
 \text{(10.)} \\
 121\frac{1}{4} = 121.944444 + (11.042 + \\
 \quad \underline{1} \\
 \quad 21)21 \\
 \quad \quad \underline{21} \\
 2204)9444 \\
 \quad \quad \underline{8816} \\
 22082)62844 \\
 \quad \quad \underline{44164} \\
 \quad \quad \quad 18680
 \end{array}$$

$$\begin{array}{r}
 \text{(11.)} \\
 \frac{339\frac{1}{2}}{462} = \frac{337\frac{1}{2}}{462} = \frac{38}{49}; \sqrt{\frac{38}{49}} = \frac{6}{7} \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{(12.)} \\
 \frac{761\frac{1}{2}}{1557\frac{2}{3}} = \frac{1000}{20250} = \frac{4}{81}; \sqrt{\frac{4}{81}} = \frac{2}{9} \text{ Ans.}
 \end{array}$$

## APPLICATION OF THE SQUARE ROOT.

(ART. 270, p. 268.)

1.  $\sqrt{226576} = 476$  Ans.
2. 640 acres = 102400 rods;  $\sqrt{102400} = 320$  rods, Ans.
3.  $125 \times 53 = 6625$ rd.;  $62\frac{1}{2} \times 34 = 2125$ rd.;  $37 \times 160 = 5920$ rd.;  $6625 + 2125 + 5920 = 14670$ rd.;  $\sqrt{14670} = 121.11+$  rods, Ans.
4.  $242 \times 242 = 58564$  feet, area of the first lot;  $58564 \times 9 = 527076$ .  $\sqrt{527076} = 726$  feet, Ans.

5.  $124A. \times 160 = 19840$  rods, area of the former pasture;  
 $4 : 5 :: 19840 : 24800$ , area of the latter;  $\sqrt{24800} = 157.48 + \text{rd.}$ , Ans.
6.  $2 : 3 :: 216 : 324$ ;  $\sqrt{324} = 18$  trees in length;  $3 : 2 :: 216 : 144$ ;  $\sqrt{144} = 12$  trees in breadth;  $18 - 1 = 17$ ;  $17 \times 25 = 425 \text{ft.}$ ;  $12 - 1 = 11$ ;  $11 \times 25 = 275 \text{ft.}$ ;  $425 \times 275 = 116875 \text{ sq. ft.}$ , Ans.
1. (ART. 275, p. 269.)  $40 \times 40 = 1600$ ;  $9 \times 9 = 81$ ;  
 $1600 + 81 = 1681$ ;  $\sqrt{1681} = 41 \text{ft.}$ , Ans.
2.  $360 \times 360 = 129600$ ;  $450 \times 450 = 202500$ ;  $129600 + 202500 = 332100$ ;  $\sqrt{332100} = 576.2 + \text{miles}$ , Ans.
3.  $60 \times 60 = 3600 \text{ft.}$ ;  $36 \times 36 = 1296 \text{ft.}$ ;  $3600 - 1296 = 2304 \text{ft.}$ ;  $\sqrt{2304} = 48 \text{ feet}$ , Ans.
4.  $120 \times 120 = 14400 \text{ft.}$ ;  $50 \times 50 = 2500 \text{ft.}$ ;  $14400 - 2500 = 11900 \text{ft.}$ ;  $\sqrt{11900} = 109.08 + \text{feet}$ , Ans.
5.  $160 + 20 = 180$ ;  $180 \times 180 = 32400$ ;  $500 \times 500 = 250000$ ;  $250000 - 32400 = 217600$ ;  $\sqrt{217600} = 466.47 +$ ;  $466.47 + - 100 = 366.47 + \text{feet}$ , Ans.
6.  $110 + 90 = 200$ ;  $300 \times 300 = 90000$ ;  $200 \times 200 = 40000$ ;  $90000 - 40000 = 50000$ ;  $\sqrt{50000} = 223.6 + \text{ft.}$ ;  $223.6 + - 160 = 63.6 + \text{feet}$ , Ans.
7.  $60 \times 60 = 3600$ ;  $80 \times 80 = 6400$ ;  $3600 + 6400 = 10000$ ;  $\sqrt{10000} = 100$ ;  $70 \times 70 = 4900$ ;  $4900 + 6400 = 11300$ ;  $\sqrt{11300} = 106.30 +$ ;  $90 \times 90 = 8100$ ;  $8100 + 4900 = 13000$ ;  $\sqrt{13000} = 114.01 +$ ;  $8100 + 3600 = 11700$ ;  $\sqrt{11700} = 108.16 +$ ;  $100 + 106.30 + 114.01 + 108.16 = 428.47 + \text{rods}$ , Ans.
8.  $24 \times 24 = 576 \text{ft.}$ ;  $18 \times 18 = 324 \text{ft.}$ ;  $576 + 324 = 900 \text{ft.}$ ;  $12 \times 12 = 144$ ;  $900 + 144 = 1044 \text{ft.}$ ;  $\sqrt{1044} = 32.3 + \text{feet}$ , Ans.
2. (ART. 279, p. 271.)  $16 : 8 :: 16^2 : 128$ ;  $\sqrt{128} = 11.31 + \text{feet}$ , Ans.

3.  $11 : 33 :: 11^2 : 363$ ;  $\sqrt{363} = 19.05+$  rods, Ans.  
 4.  $28.3 : 42.5 :: 6^2 : 54.06+$ ;  $\sqrt{54.06+} = 7.35+$  feet.,  
 Ans.  
 5.  $2000 : 4000 :: 3^2 : 18$ ;  $\sqrt{18} = 4.24+$  inches, Ans.  
 6.  $1000 : 5000 :: 4^2 : 80$ ;  $\sqrt{80} = 8.94+$  inches, Ans.  
 7.  $12^2 : 8^2 :: 72 : 32$  rods, Ans.  
 8.  $45^2 : 15^2 :: 950 : 105.55+$  square rods, Ans.  
 9.  $6^2 : 9^2 :: 1.178+ : 2.65+$  feet, Ans.  
 10.  $3^2 : 2^2 :: 20\frac{1}{4} : 9$  minutes, Ans.  
 11.  $\frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$ ;  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ ;  $\frac{9}{16} - \frac{1}{4} = \frac{5}{16}$ ;  $\frac{5}{16} : \frac{9}{16} ::$   
 $50 : 62\frac{4}{5}$  minutes, Ans.

1. (ART. 280, p. 272.)  $12^2 = 144$ ;  $144 \div 2 = 72$ ;  $\sqrt{72} =$   
 $8.48+$  feet, Ans.  
 2.  $30^2 = 900$ ;  $900 \div 2 = 450$ ;  $\sqrt{450} = 21.2+$  inches  
 square, Ans.  
 3.  $1.5 \times 1.5 = 2.25$ ;  $2.25 \div 2 = 1.1250$ ;  $\sqrt{1.1250} =$   
 $1.06+$  inches, Ans.

## EXTRACTION OF THE CUBE ROOT.

(ART. 282, p. 276.)

| (2.)                           | (3.)                            |
|--------------------------------|---------------------------------|
| 74088(42                       | 185193(57                       |
| 64                             | 125                             |
| $4^3 \times 300 = 4800$ )10088 | $5^3 \times 300 = 7500$ )60193  |
| $4800 \times 2 = 9600$         | $7500 \times 7 = 52500$         |
| $2^3 \times 30 \times 4 = 480$ | $7^3 \times 30 \times 5 = 7350$ |
| $2 \times 2 \times 2 = 8$      | $7 \times 7 \times 7 = 343$     |
| 10088                          | 60193                           |

(4.)

 $80621568(432$ 64

$4^2 \times 300 = 4800)16621$

$4800 \times 3 = 14400$

$3^2 \times 30 \times 4 = 1080$

$3 \times 3 \times 3 = 27$

15507

$43^2 \times 300 = 554700)1114568$

$554700 \times 2 = 1109400$

$2^2 \times 30 \times 43 = 5160$

$2 \times 2 \times 2 = 8$

1114568

(5.)

 $176558481(561$ 125

$5^2 \times 300 = 7500)51558$

$7500 \times 6 = 45000$

$6^2 \times 30 \times 5 = 5400$

$6 \times 6 \times 6 = 216$

50616

$56^2 \times 300 = 940800)942481$

$940800 \times 1 = 940800$

$1^2 \times 30 \times 56 = 1680$

$1 \times 1 \times 1 = 1$

942481

(6.)

 $257259456(636$ 216

$6^2 \times 300 = 10800)41259$

$10800 \times 3 = 32400$

$3^2 \times 30 \times 6 = 1620$

$3 \times 3 \times 3 = 27$

34047

$63^2 \times 300 = 1190700)7212456$

$1190700 \times 6 = 7144200$

$6^2 \times 30 \times 63 = 68040$

$6 \times 6 \times 6 = 216$

7212456

(7.)

 $1860867(123$ 1

$1^2 \times 300 = 300)860$

$300 \times 2 = 600$

$2^2 \times 30 \times 1 = 120$

$2 \times 2 \times 2 = 8$

728

$12^2 \times 300 = 43200)132867$

$43200 \times 3 = 129600$

$3^2 \times 30 \times 12 = 3240$

$3 \times 3 \times 3 = 27$

132867

(8.)

$$\begin{array}{r} 1879080904(1234 \\ 1 \end{array}$$

$$1^2 \times 300 = 300 \underline{)879}$$

$$300 \times 2 = 600$$

$$2^2 \times 30 \times 1 = 120$$

$$2 \times 2 \times 2 = \underline{8}$$

$$728$$

$$12^2 \times 300 = 43200 \underline{)151080}$$

$$43200 \times 3 = 129600$$

$$3^2 \times 30 \times 12 = 3240$$

$$3 \times 3 \times 3 = \underline{27}$$

$$132867$$

$$123^2 \times 300 = 4538700 \underline{)18213904}$$

$$4538700 \times 4 = 18154800$$

$$4^2 \times 30 \times 123 = 59040$$

$$4 \times 4 \times 4 = \underline{64}$$

$$18213904$$

(9.)

$$\begin{array}{r} 41673648.563(346.7 \\ 27 \end{array}$$

$$3^2 \times 300 = 2700 \underline{)14673}$$

$$2700 \times 4 = 10800$$

$$4^2 \times 30 \times 3 = 1440$$

$$4 \times 4 \times 4 = \underline{64}$$

$$12304$$

$$34^2 \times 300 = 346800 \underline{)2369648}$$

(Carried forward.)

(Brought forward.)

$$34^2 \times 300 = 346800 \underline{)2369648}$$

$$346800 \times 6 = 2080800$$

$$6^2 \times 30 \times 34 = 36720$$

$$6 \times 6 \times 6 = 216$$

$$\underline{2117736}$$

$$346^2 \times 300 = 35914800 \underline{)251912563}$$

$$35914800 \times 7 = 251403600$$

$$7^2 \times 30 \times 346 = 508620$$

$$7 \times 7 \times 7 = 343$$

$$\underline{251912563}$$

(10.)

$$483921.516051(78.51$$

$$\underline{343}$$

$$7^2 \times 300 = 14700 \underline{)140921}$$

$$14700 \times 8 = 117600$$

$$8^2 \times 30 \times 7 = 13440$$

$$8 \times 8 \times 8 = 512$$

$$\underline{131552}$$

$$78^2 \times 300 = 1825200 \underline{)9369516}$$

$$1825200 \times 5 = 9126000$$

$$5^2 \times 30 \times 78 = 58500$$

$$5 \times 5 \times 5 = 125$$

$$\underline{9184625}$$

$$785^2 \times 300 = 184867500 \underline{)184891051}$$

$$184867500 \times 1 = 184867500$$

$$1^2 \times 30 \times 785 = 23550$$

$$1 \times 1 \times 1 = 1$$

$$\underline{184891051}$$

(11.)

$$\begin{array}{r} 8.144865728 \\ \times 2.012 \\ \hline \end{array}$$

8

$$20^2 \times 300 = 120000)144865$$

$$120000 \times 1 = 120000$$

$$1^2 \times 30 \times 20 = 600$$

$$1 \times 1 \times 1 = 1$$

$$\hline 120601$$

$$201^2 \times 300 = 12120300)24264728$$

$$12120300 \times 2 = 24240600$$

$$2^2 \times 30 \times 201 = 24120$$

$$2 \times 2 \times 2 = 8$$

$$\hline 24264728$$

(12.)

$$\begin{array}{r} .075686967 \\ \times .423 \\ \hline \end{array}$$

64

$$4^2 \times 300 = 4800)11686$$

$$4800 \times 2 = 9600$$

$$2^2 \times 30 \times 4 = 480$$

$$2 \times 2 \times 2 = 8$$

$$\hline 10088$$

$$42^2 \times 300 = 529200)1598967$$

$$529200 \times 3 = 1587600$$

$$3^2 \times 30 \times 42 = 11340$$

$$3 \times 3 \times 3 = 27$$

$$\hline 1598967$$

(13.)

$$\begin{array}{r} 25 \\ \times 2.92 \\ \hline \end{array}$$

8

$$2^2 \times 300 = 1200)17000$$

$$1200 \times 9 = 10800$$

$$9^2 \times 30 \times 2 = 4860$$

$$9 \times 9 \times 9 = 729$$

$$\hline 16389$$

$$29^2 \times 300 = 252300)611000$$

$$252300 \times 2 = 504600$$

$$2^2 \times 30 \times 29 = 3480$$

$$2 \times 2 \times 2 = 8$$

$$\hline 508088$$

$$102912$$



(ART. 282, p. 277.)

(1.)

$$81\frac{1}{11} = \frac{81.454545454(4.334 + \frac{64}{64})}{64}$$

$$4^2 \times 300 = 4800 \underline{17454}$$

$$4800 \times 3 = 14400$$

$$3^2 \times 30 \times 4 = 1080$$

$$3 \times 3 \times 3 = 27$$

$$\underline{15507}$$

$$43^2 \times 300 = 554700 \underline{1947545}$$

$$554700 \times 3 = 1664100$$

$$3^2 \times 30 \times 43 = 11610$$

$$3 \times 3 \times 3 = 27$$

$$\underline{1675737}$$

$$433^2 \times 300 = 56246700 \underline{271808454}$$

$$56246700 \times 4 = 224986800$$

$$4^2 \times 30 \times 433 = 255840$$

$$4 \times 4 \times 4 = 64$$

$$\underline{225242704}$$

$$46565750$$

(2.)

$$\sqrt[3]{4096} = \frac{8}{16} \text{ Ans.}$$

$$729(9$$

$$\underline{729}$$

$$4096(16$$

$$\underline{1}$$

$$1^2 \times 300 = 300 \underline{3096}$$

$$300 \times 6 = 1800$$

$$6^2 \times 30 \times 1 = 1080$$

$$6 \times 6 \times 6 = 216$$

$$\underline{3096}$$

(3.)

$$49\frac{8}{27} = 1\frac{231}{27};$$

$$\sqrt[3]{1\frac{231}{27}} = \frac{11}{3} = 3\frac{2}{3} \text{ Ans.}$$

$$1331(11$$

$$\underline{1}$$

$$27(3$$

$$\underline{27}$$

$$1^2 \times 300 = 300 \underline{331}$$

$$300 \times 1 = 300$$

$$1^2 \times 30 \times 1 = 30$$

$$1 \times 1 \times 1 = 1$$

$$\underline{331}$$

|                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>(4.)</p> $166\frac{2}{3} = 1\frac{331}{3};$ $^3\sqrt{1331} = \frac{11}{1} = 5\frac{1}{2} \text{ Ans.}$ $\begin{array}{r} 1331(11 \quad \dot{8}(2 \\ \underline{1} \quad \quad \quad 8 \end{array}$ $1^3 \times 300 = 300 \overline{)331}$ $\begin{array}{r} 300 \times 1 = 300 \\ 1^3 \times 30 \times 1 = 30 \\ 1 \times 1 \times 1 = 1 \\ \hline 331 \end{array}$ | <p>(5.)</p> $85\frac{23}{25} = 1\frac{10648}{25};$ $^3\sqrt{10648} = \frac{22}{2} = 4\frac{1}{2} \text{ Ans.}$ $\begin{array}{r} 10648(22 \\ \underline{8} \end{array}$ $2^3 \times 300 = 1200 \overline{)2648}$ $\begin{array}{r} 1200 \times 2 = 2400 \\ 2^3 \times 30 \times 2 = 240 \\ 2 \times 2 \times 2 = 8 \\ \hline 2648 \end{array}$ |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

1. (ART. 283, p. 277.)  $^3\sqrt{2744} = 14$  feet, Ans.
2.  $268\frac{1}{4} \times 8 = 2150\frac{1}{2}$  cubic inches in 1 gallon;  $2150\frac{1}{2} \times 400 = 860160$  cubic inches  $= 497\frac{1}{2}$  cubic feet in 400 bushels;  $^3\sqrt{497.777} + \text{ft.} = 7.92 + \text{ft.}$ , Ans.
3.  $18 \times 15 \times 10 = 2700 \text{ft.}$ ;  $^3\sqrt{2700 \text{ft.}} = 13.92 + \text{ft.}$ , Ans.
2. (ART. 288, p. 278.)  $2^3 = 8 : 12^3 = 1728 :: \$ 6.25$   
\$ 1350 Ans.
3.  $4^3 = 64 : 6^3 = 216 :: 50 : 168.7 + \text{lb.}$ , Ans.
4.  $16 : 8 :: 12^3 = 1728 : 864$ ;  $^3\sqrt{864} = 9.5 +$ ;  $12 - 9.5 + = 2.5 + \text{in.}$ , Ans.
5.  $6^3 = 216 : 7^3 = 343 :: 800 : 1270.3 + \text{lb.}$ , Ans.
6.  $1^3 : 2^3 = 8 :: 1 : 8$  cords, Ans.
7.  $30^3 = 27000 : 40^3 = 64000 :: 1000 : 2370.3 + \text{lb.}$ , Ans.
8.  $6^3 = 216 : 12^3 = 1728 :: 16 : 128$  ounces, Ans.
9.  $15^3 = 3375$ ;  $3375 \times \frac{2}{3} = 2250$ ;  $^3\sqrt{2250} = 13.1 +$  feet, Ans.

### ARITHMETICAL PROGRESSION.

2. (ART. 290, p. 280.)  $\frac{55-7}{17-1} = 3$  Ans.
3.  $\frac{14-4}{15-1} = \frac{10}{14} = \frac{5}{7}$  Ans.      4.  $\frac{17-9}{10-1} = \frac{8}{9}$  miles, Ans.

2. (ART. 291, p. 281.)  $\overline{\$51 + \$7} \times 6 = \$348$  Ans.

3.  $\frac{198 \times 99}{2} = 9801$  rods, Ans.

2. (ART. 292, p. 282.)  $\frac{47-8}{3} + 1 = 14$  days, Ans.

(ART. 293, p. 283.)

2.  $\frac{137-12}{5} + 1 = 26$ ;  $\frac{137+12 \times 26}{2} = 1937$  lines, Ans.

2. (ART. 294, p. 284.)  $\overline{12-1} \times 2 + 7 = 29$  miles, Ans.

3.  $\overline{10-1} \times 1\frac{1}{2} = 13\frac{1}{2}$ ;  $20\frac{1}{4} - 13\frac{1}{2} = 6\frac{3}{4}$  miles, Ans.

2. (ART. 296, p. 285.)  $\overline{(6-1) \times \$15} + \$250 = \$325$ ;  
 $\overline{250 + 325} \times 3 = \$1725$  Ans.

3.  $\overline{(10-1) \times \$19} + \$380 = \$551$ ;  $\overline{551 + 380} \times 5 =$   
 $\$4655$  Ans.

4.  $\overline{(8-1) \times \$49.50} + \$825 = \$1171.50$ ;  $\overline{1171.50 + 825}$   
 $\times 4 = \$7986$  Ans.

5.  $\overline{(6-1) \times \$8} + \$200 = \$240$ ;  $\overline{240 + 200} \times 3 =$   
 $\$1320$  Ans.

6.  $\overline{(8-1) \times \$42} + \$700 = \$994$ ;  $\overline{994 + 700} \times 4 =$   
 $\$6776$ ;  $\$6776 - \$100 = \$6676$  Ans.

7.  $\overline{(12-1) \times \$0.50} + \$50 = \$55.50$ ;  $\overline{55.50 + 50} \times 6$   
 $= \$633$  Ans.

### GEOMETRICAL PROGRESSION.

2. (ART. 298, p. 287.)  $5^5 = 15625$ ;  $15625 \times 4 = 62500$  Ans.

3.  $4^5 = 1024$ ;  $1024 \times 28672 = 29320000$ ;  $29320000 \div 4096 = 7$  Ans.

4.  $4^7 = 16384$ ;  $16384 \times 5 = 81920$  Ans.

5.  $20^4 = 160000$ ;  $160000 \times 10 = 1600000$  Ans. [Ans.

6.  $1.06^5 = 1.3382255776$ ;  $1.3382255776 \times 30 = 40.146767328$

$$7. 1.06^5 = 1.3382255776 ; 1.3382255776 \times \$ 1728 = \$ 2312.453798 + \text{Ans.} \quad [\text{Ans.}]$$

$$8. 1.05^4 = 1.21550625 ; 1.21550625 \times \$ 328.90 = \$ 399.78 +$$

$$9. 3^{14} = 4782969 ; 4782969 \times \$ 0.05 = \$ 239148.45 \text{ Ans.}$$

$$3. (\text{ART. 299, p. 289.}) \frac{4^7 - 1}{4 - 1} \times 8 = 43688 \text{ Ans.}$$

$$4. \frac{1 - \frac{3}{4}}{1 - \frac{3}{4}} \times 10 = \frac{1 - \frac{3}{4}}{\frac{1}{4}} = \frac{1 - \frac{3}{4}}{\frac{1}{4}} = 30 \frac{1}{4} \text{ Ans.}$$

$$5. \frac{1.06^4 - 1}{1.06 - 1} \times 18 = 78.743 + \text{Ans.}$$

$$6. \frac{1.05^5 - 1}{1.05 - 1} \times \$ 144 = \$ 795.6909 \text{ Ans.}$$

$$7. 1\frac{2}{3} = \frac{5}{3} ; \frac{\frac{5}{3}^6 - 1}{\frac{5}{3} - 1} = \frac{15625 - 1}{2} = 7812 \frac{1}{2} = \$ 9147 \frac{1}{2} \text{ Ans.}$$

$$8. \frac{4^{10} - 1}{4 - 1} \times \$ 0.01 = \$ 3495.25 \text{ Ans.}$$

$$2. (\text{ART. 301, p. 291.}) \frac{1.05^4 - 1}{1.05 - 1} \times \$ 1728 = \$ 7447.89,6 + \text{Ans.}$$

$$3. \frac{1.06^7 - 1}{1.06 - 1} \times \$ 87 = \$ 730.26,3 + \text{Ans.}$$

$$4. \frac{1.06^6 - 1}{1.06 - 1} \times \$ 500 = \$ 3487.65,9 + \text{Ans.}$$

$$5. \frac{1.06^{10} - 1}{1.06 - 1} \times \$ 96 = \$ 1265.35,6 + \text{Ans.}$$

$$6. \frac{1.06^3 - 1}{1.06 - 1} \times \$ 1000 = \$ 3183.60 \text{ Ans.}$$

$$7. \frac{1.06^8 - 1}{1.06 - 1} \times \$ 56 = \$ 470.05,4 + \text{Ans.}$$

$$8. \frac{1.05^7 - 1}{1.05 - 1} \times \$ 25 = \$ 203.55 ; \frac{1.06^{10} - 1}{1.06 - 1} \times \$ 20 = \$ 263.61,5 + ; \$ 263.61,5 - \$ 203.55 = \$ 60.06,5 + ,$$

William receives more than Samuel, Ans.

$$9. \frac{1.05^{14} - 1}{1.05 - 1} \times \$ 10 = \$ 195.98,6 + \text{Ans.}$$

## ALLIGATION.

|                                          |                     |                                            |
|------------------------------------------|---------------------|--------------------------------------------|
| (2.)                                     | (ART. 304, p. 292.) | (3.)                                       |
| $\$0.20 \times 30 = \$6.00$              |                     | $\$0.40 \times 4 = \$1.60$                 |
| $\$0.25 \times 40 = \$10.00$             |                     | $\$0.85 \times 8 = \$6.80$                 |
| $\$0.30 \times 70 = \$21.00$             |                     | $\$1.00 \times 12 = \$12.00$               |
| $\$0.40 \times 80 = \$32.00$             |                     | $\$1.50 \times 10 = \$15.00$               |
| 220gal. \$69.00                          |                     | 34bu. \$35.40                              |
| $\$69 \div 220 = \$0.31\frac{1}{4}$ Ans. |                     | $\$35.40 \div 34 = \$1.04\frac{2}{7}$ Ans. |

(4.)

$$\begin{aligned} \$0.10 \times 30 &= \$3.00 \\ \$0.12 \times 25 &= \$3.00 \\ \$0.15 \times 4 &= \$0.60 \\ \$0.20 \times 50 &= \$10.00 \\ \hline 109\text{lb.} &\$16.60 \\ \$16.60 \div 109 &= \$0.15\frac{25}{109} \text{ Ans.} \end{aligned}$$

(ART. 306, p. 294.)

(3.)

$$42 \left\{ \begin{array}{l} 25 \\ 30 \\ 40 \\ 50 \end{array} \right\} \begin{array}{l} 8 \\ 8 \\ 8 \\ 8 \end{array} \left. \vphantom{\begin{array}{l} 25 \\ 30 \\ 40 \\ 50 \end{array}} \right\} \text{Ans.}$$

$$17 + 12 + 2 = 31$$

(4.)

$$18 \left\{ \begin{array}{l} 12 \\ 15 \\ 20 \end{array} \right\} \begin{array}{l} 2 \\ 2 \\ 6 \end{array} \left. \vphantom{\begin{array}{l} 12 \\ 15 \\ 20 \end{array}} \right\} \text{Ans.}$$

$$6 + 3 = 9$$

(ART. 307, p. 295.)

(2.)

$$1.25 \left\{ \begin{array}{l} 50 \\ 60 \\ 1.50 \\ 1.70 \end{array} \right\} \begin{array}{l} 45 \\ 25 \\ 65 \\ 75 \end{array} \left. \vphantom{\begin{array}{l} 50 \\ 60 \\ 1.50 \\ 1.70 \end{array}} \right\} \text{Ans.}$$

$$\begin{array}{l} 75 : 45 :: 30 : 18\text{bu. of oats,} \\ 75 : 25 :: 30 : 10\text{bu. of peas,} \\ 75 : 65 :: 30 : 26\text{bu. of beans,} \end{array}$$

(3.)

$$\begin{aligned} .10 \times 1.25 &= .12\frac{1}{2} \\ .12 \times 1.25 &= .15 \\ .15 \times 1.25 &= .18\frac{3}{4} \end{aligned}$$

$$14 \left\{ \begin{array}{l} 12\frac{1}{2} \\ 15 \\ 18\frac{3}{4} \end{array} \right\} \begin{array}{l} 1\frac{1}{2} \\ 1\frac{1}{2} \\ 1\frac{1}{2} \end{array} \left. \vphantom{\begin{array}{l} 12\frac{1}{2} \\ 15 \\ 18\frac{3}{4} \end{array}} \right\} \text{Ans.}$$

$$\begin{array}{l} 1 + 4\frac{3}{4} = 5\frac{3}{4} \\ 1\frac{1}{2} : 5\frac{3}{4} :: 100 : 383\frac{1}{2}\text{lb.} \\ 1\frac{1}{2} : 1\frac{1}{2} :: 100 : 100\text{lb.} \end{array}$$

(ART. 308, p. 296.)

(2.)

$$\begin{array}{r}
 1.80 \left\{ \begin{array}{l} 0.00 \\ 2.00 \\ 2.50 \end{array} \right. \begin{array}{l} \boxed{\phantom{00}} \\ \boxed{\phantom{00}} \\ \boxed{\phantom{00}} \end{array} \quad .70 + .20 = .90 \\
 \hline
 1.80 \\
 1.80 \\
 \hline
 4.50
 \end{array}$$

$$\begin{array}{l}
 4.50 : .90 :: 100 : 20 \text{ bushels of chaff,} \\
 4.50 : 1.80 :: 100 : 40 \text{ bushels of wheat,} \\
 4.50 : 1.80 :: 100 : 40 \text{ bushels of rye,}
 \end{array} \left. \vphantom{\begin{array}{l} 4.50 : .90 \\ 4.50 : 1.80 \\ 4.50 : 1.80 \end{array}} \right\} \text{Ans.}$$

(3.)

$$\begin{array}{r}
 .20 \times 1.10 = .22 \\
 .30 \times 1.10 = .33
 \end{array}
 \begin{array}{l}
 25 \left\{ \begin{array}{l} 22 \\ 33 \end{array} \right. \begin{array}{l} \boxed{\phantom{00}} \\ \boxed{\phantom{00}} \end{array} \quad \begin{array}{l} 8 \\ 3 \end{array} \\
 \hline
 11
 \end{array}
 \begin{array}{l}
 11 : 8 :: 80 : 58\frac{2}{11} \text{ gal.} \\
 11 : 3 :: 80 : 21\frac{8}{11} \text{ gal.}
 \end{array} \left. \vphantom{\begin{array}{l} 11 : 8 \\ 11 : 3 \end{array}} \right\} \text{Ans.}$$

(4.)

$$\begin{array}{r}
 12 \left\{ \begin{array}{l} 10 \\ 15 \end{array} \right. \begin{array}{l} \boxed{\phantom{00}} \\ \boxed{\phantom{00}} \end{array} \quad \begin{array}{l} 3 \\ 2 \end{array} \\
 \hline
 5
 \end{array}
 \begin{array}{l}
 5 : 3 :: 60 : 36 \text{ thousand,} \\
 5 : 2 :: 60 : 24 \text{ thousand,}
 \end{array} \left. \vphantom{\begin{array}{l} 5 : 3 \\ 5 : 2 \end{array}} \right\} \text{Ans.}$$

### PERMUTATION.

2. (ART. 310, p. 297.)  $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 = 362880 \text{ days} = 994 \text{ years, } 70 \text{ days, Ans.}$
3.  $12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 479001600;$   
1 to 479001600 Ans.
4.  $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 5040 \text{ words, Ans.}$

### MENSURATION OF SURFACES.

1. (ART. 314, p. 299.)  $18 \div 2 = 9; 24 \times 9 = 216 \text{ ft. Ans.}$
2.  $50 + 60 + 70 = 180; 180 \div 2 = 90; 90 - 50 = 40;$   
 $90 - 60 = 30; 90 - 70 = 20; 90 \times 40 \times 30 \times 20 =$   
 $2160000; \sqrt{2160000} = 1469.69 + \text{ rods, Ans.}$
1. (ART. 317, p. 300.)  $25 \times 3 = 75 \text{ feet, Ans.}$
2.  $37 \times 27 = 999 \text{ ft.}; 40 \times 20 = 800 \text{ ft.}; 999 - 800 = 199 \text{ ft.}$
3.  $15 \times 12 = 180 \text{ ft. Ans.}$  [Ans.]

1. (ART. 319, p. 301.)  $482 + 324 = 806\text{ft.}$ ;  $806 \div 2 = 403$ ;  
 $403 \times 216 = 87048$  square feet, Ans.
2.  $28 + 20 = 48\text{in.}$ ;  $48 \div 2 = 24\text{in.} = 2\text{ft.}$ ;  $2 \times 22 = 44$   
 square feet, Ans.
1. (ART. 321, p. 301.)  $65 \times \frac{1}{2} = 455$ ;  $65 \times \frac{1}{2} = 585$ ;  
 $455 + 585 = 1040$  square feet, Ans.
2.  $125 \times \frac{1}{2} = 4375$ ;  $125 \times \frac{3}{2} = 5312.5$ ;  $4375 + 5312.5 =$   
 $9687.5$  square rods, Ans.
1. (ART. 324, p. 302.)  $35 \times 5 = 175$ ;  $175 \times 24\frac{1}{2} = 2107$   
 square feet, Ans.
2.  $20 \times 6 = 120$ ;  $120 \times 11\frac{1}{2} = 1039.20$  square feet, Ans.
1. (ART. 326, p. 302.)  $3.141592 \times 50 = 157.0796 + \text{ft.}$  Ans.
2.  $3.141592 \times 100 = 314.15 +$  rods, Ans.
1. (ART. 327, p. 302.)  $.318309 \times 80 = 25.46 +$  miles, Ans.
2.  $.318309 \times 62.84 = 20 +$  feet, Ans.
1. (ART. 328, p. 303.)  $200 \times 200 \times .785398 = 31415.92$   
 square feet, Ans.
2.  $400 \times 400 \times .079577 = 12732 + \text{p.} = 79\text{A. } 2\text{R. } 12 + \text{p.}$  Ans.
1. (ART. 329, p. 303.)  $40 \times .886227 = 35.44 +$  rods, Ans.
2.  $100 \times .282094 = 28.2 +$  rods, Ans.
1. (ART. 330, p. 304.)  $30 \times .707106 = 21.21 +$  inches, Ans.
2.  $100 \times .225079 = 22.5 +$  rods square, Ans.
1. (ART. 332, p. 304.)  $14 \times 10 \times .785398 = 109.95 +$  sq. in. [Ans.]
2.  $8 \times 5 \times .785398 = 31.415 + \text{ft.} = 31 \text{ sq. ft. } 59 \text{ sq. in.}$  Ans.

---

### MENSURATION OF SOLIDS.

1. (ART. 335, p. 305.)  $3 \times 3 = 9$ ;  $9 \times 15 = 135$ ;  $3 + 3 +$   
 $3 = 9 \div 2 = 4.5$ ;  $4.5 - 3 = 1.5$ ;  $1.5 \times 1.5 \times 1.5 \times$   
 $4.5 = 15.1975$ ;  $\sqrt{15.1975} = 3.895 +$ ;  $3.895 \times 2 =$   
 $7.79 +$ ;  $135 + 7.79 + = 142.79 +$  square feet, Ans.

2.  $9 \times 4 = 36$ ;  $36 \times 25 = 900$ ;  $9 \times 9 = 81$ ;  $81 \times 2 = 162$ ;  
 $900 + 162 = 1062$  square feet, Ans.

1. (ART. 336, p. 306.)  $5 + 4 + 3 = 12$ ;  $12 \div 2 = 6$ ;  $6 - 5 = 1$ ;  $6 - 4 = 2$ ;  $6 - 3 = 3$ ;  $1 \times 2 \times 3 \times 6 = 36$ ;  
 $\sqrt{36} = 6$ ;  $20 \times 6 = 120$  cubic feet, Ans.

2.  $8 \times 8 \times 8 = 512$  cubic feet, Ans.

3.  $30 \times 20 \times 10 = 6000$  cubic feet, Ans.

1. (ART. 338, p. 306.)  $3 \times 4 = 12$ ;  $3 \times 3 \times .079577 = .716 +$ ;  $.716 \times 2 = 1.43 +$ ;  $12 + 1.43 + = 13.43$  square feet, Ans.

2.  $2 \times 3.141592 = 6.283184$ ;  $6.283184 \times 12 = 75.39$  sq. ft.  
 [Ans.]

1. (ART. 339, p. 306.)  $2 \times 2 \times .785398 = 3.141592$ ;  $3.141592 \times 8 = 25.13 +$  cubic feet, Ans.

2.  $5 \times 5 \times .785398 = 19.63495$ ;  $19.63495 \times 20 = 392.69$  ft.  
 [Ans.]

1. (ART. 342, p. 307.)  $100$  ft. =  $1200$  in.;  $54$  ft. =  $648$  in.;  
 $1200 \div 2 = 600$ ;  $648 \times 600 = 388800$ ;  $388800 \div 27 = 14400$  in. =  $400$  yards, Ans.

2.  $50 \div 2 = 25$ ;  $25 \times 12 = 300$  square feet, Ans.

1. (ART. 343, p. 307.)  $693 \times 693 = 480249$ ;  $480249 \times 500 = 240124500$ ;  $240124500 \div 3 = 80,041,500$  cubic feet;  
 $80,041,500 \div 8 = 10,005,187.5$  feet;  $10,005,187.5 \div 5280 = 1894.9$  miles, Ans.

2.  $5 \times 5 \times .785398 = 19.6349$ ;  $19.6349 \times 30 = 589.04$ ;  
 $589.04 \div 3 = 196.3$  feet, Ans.

1. (ART. 346, p. 308.)  $8 \times 4 = 32$ ;  $4 \times 4 = 16$ ;  $32 + 16 = 48$ ;  $48 \times 20 = 960$ ;  $960 \div 2 = 480$ ;  $8 \times 8 = 64$ ;  
 $4 \times 4 = 16$ ;  $64 + 16 = 80$ ;  $480 + 80 = 560$  sq. ft. Ans.

2.  $18 + 9 = 27$ ;  $27 \times 12 = 324$ ;  $324 \div 2 = 162$ ;  $18 \times 18 \times .079577 = 25.78 +$ ;  $9 \times 9 \times .079577 = 6.44 +$ ;  
 $25.78 + 6.44 = 32.22 +$ ;  $162 + 32.22 + = 194.22 +$  square feet, Ans.



1. (ART. 347, p. 308.)  $20 \times 20 = 400$ ;  $10 \times 10 = 100$ ;  
 $400 \times 100 = 40000$ ;  $\sqrt{40000} = 200$ ;  $200 + 400 +$   
 $100 = 700$ ;  $700 \times 30 = 21000$ ;  $21000 \div 3 = 7000$   
cubic feet, Ans.
2.  $12 \times 12 \times .785398 = 113.097+$ ;  $6 \times 6 \times .785398 = 28.274$ ;  
 $113.097 \times 28.274 = 3197.704578$ ;  $\sqrt{3197.704578} =$   
 $56.548+$ ;  $56.548 + 113.097 + 28.274 = 197.919+$  in.  
 $= 1.3744+$  ft.;  $1.3744+ \times 20 = 27.488+$ ;  $27.488+$   
 $+ 3 = 9.162+$  feet, Ans.
1. (ART. 349, p. 309.)  $3.141592 \times 20 = 62.83+$ ;  $62.83+$   
 $\times 20 = 1256.6+$  square inches, Ans.
2.  $3.141592 \times 8000 = 25132.736$ ;  $25132.736 \times 8000 =$   
201061888 square miles, Ans.
1. (ART. 350, p. 309.)  $20 \times 20 \times 20 \times .523598 =$   
4188.7+ inches, Ans.
2.  $5 \times 5 \times 5 \times .523598 = 65.44+$  cubic feet, Ans.
1. (ART. 351, p. 309.)  $10 \times 10 = 100$ ;  $100 \div 3 = 33.33+$ ;  
 $\sqrt{33.33+} = 5.773+$  inches, Ans. [Ans.
2.  $30 \times 30 = 900$ ;  $900 \div 3 = 300$ ;  $\sqrt{300} = 17.32+$  feet,
1. (ART. 353, p. 310.)  $20 \times 20 \times 30 \times .523598 = 6283.17+$   
cubic feet, Ans.
2.  $30 \times 30 \times 10 \times .523598 = 4712.38+$  cubic feet, Ans.

### MENSURATION OF LUMBER AND TIMBER.

1. (ART. 355, p. 310.)  $16 \times 18 = 288$  in.;  $288$  in.  $\div 12 =$   
24 feet, Ans.
2.  $24 \times 30 = 720$  in.;  $720$  in.  $\div 12 = 60$  feet, Ans.
1. (ART. 356, p. 310.)  $4 \times 3 \times 12 = 144$  in.;  $144$  in.  $\div 12$   
 $= 12$  feet, Ans.
2.  $10 \times 10 \times 25 = 2500$  in.;  $2500 \div 12 = 208\frac{1}{3}$  feet, Ans.

1. (ART. 357, p. 311.)  $60 \div 4 = 15$ ;  $15 \times 15 = 225$ ;  
 $225 \times 50 = 11250$ ;  $11250 \div 144 = 78\frac{1}{2}$  cubic ft., Ans.
2.  $30 \div 4 = 7.5$ ;  $7.5 \times 7.5 \times 30 = 1687.50$ ;  $1687.50 \div$   
 $144 = 11.7\frac{1}{2}$  solid feet, Ans.

# MISCELLANEOUS EXAMPLES.

(PAGE 311.)

1. 100cts. : 10cts. :: 72d. :  $7\frac{1}{2}$ d.;  $7\frac{1}{2} - 7 = \frac{1}{2}$ d. Ans.
2.  $7\frac{1}{2} = 7\frac{1}{2}$ ;  $7\frac{1}{2} - \frac{1}{2} = 7\frac{1}{2}$  Ans.
3.  $4\frac{1}{2} = 4\frac{7}{8}$ ;  $3\frac{3}{4} = 3\frac{8}{8}$ ;  $4\frac{7}{8} + 3\frac{8}{8} = 7\frac{15}{8}$  Ans.
4.  $5\frac{3}{4} \times 5 = 27\frac{3}{4}$ ;  $27\frac{3}{4} - 3\frac{3}{4} = 23\frac{1}{2}$  Ans.
5.  $\frac{7}{11}$ m. =  $\frac{7}{11} \times \frac{2}{1} = \frac{14}{11}$  =  $5\frac{4}{11}$ fur.;  $\frac{1}{11}$ fur. =  $\frac{1}{11} \times \frac{40}{1} =$   
 $3\frac{7}{11}$ rd.;  $\frac{7}{11}$ rd. =  $\frac{7}{11} \times \frac{32}{1} = \frac{224}{11} = 10\frac{4}{11}$ ft.;  $\frac{1}{2} \times \frac{1}{2} =$   
 $\frac{1}{2} = 6$ in.;  $\frac{7}{8}$ fur. =  $\frac{7}{8} \times \frac{40}{1} = \frac{280}{1} = 31\frac{1}{2}$ rd.;  $\frac{1}{8} \times \frac{32}{1}$   
 $= \frac{32}{8} = 4$ ft.;  $\frac{1}{8}$ ft. =  $\frac{1}{8} \times \frac{1}{2} = \frac{1}{16}$  = 10in.

|      |     |     |        |
|------|-----|-----|--------|
| fur. | rd. | ft. | in.    |
| 5    | 3   | 10  | 6      |
|      | 31  | 1   | 10     |
|      |     |     |        |
| 4    | 12  | 8   | 8 Ans. |

6.  $\frac{8}{11}$ R. =  $\frac{8}{11} \times \frac{40}{1} = \frac{320}{11} = 32\frac{8}{11}$ p.;  $\frac{8}{11}$ p. =  $\frac{8}{11} \times \frac{272\frac{1}{2}}{1} =$   
 $= 217\frac{1}{2} = 198$  feet.

|    |    |    |                    |         |
|----|----|----|--------------------|---------|
| A. | R. | p. | ft.                | in.     |
| 7  | 0  | 0  | 0                  | 0       |
|    |    | 32 | 198                | 0       |
|    |    |    |                    |         |
| 6  | 3  | 7  | 74                 | 0       |
|    |    |    | $\frac{1}{4} = 36$ |         |
|    |    |    |                    |         |
| 6  | 3  | 7  | 74                 | 36 Ans. |

7.  $7 : 12 :: \frac{8}{11} : \frac{88}{11} = 8$ h., time Swift will travel the distance ;  
 $5 : 12 :: \frac{8}{11} : \frac{88}{11}$ h., time Slow will travel the distance ;  
 $\frac{88}{11} - \frac{88}{11} = \frac{4}{1155}$ h.;  $\frac{4}{1155} \times \frac{60}{1} \times \frac{60}{1} = \frac{14400}{1155} =$   
 $12\frac{16}{11}$ sec. Ans.

8.  $\frac{5}{8}T. = \frac{5}{8} \times 20 = 12\frac{1}{2}\text{cwt.}$ ;  $12\frac{1}{2}\text{cwt.} : \frac{1}{4}\text{cwt.} :: \$49 : \frac{100}{100} \times \frac{1}{4} \times 4\frac{1}{2} = \$3.92 \text{ Ans.}$
9.  $8 \times 4 \times 2 = 64$ ;  $1728 \div 64 = 27$ , number of bricks in a cubic foot;  $40 \times 20 \times 2 = 1600$  cubic feet in the wall;  $1600 \times 27 = 43200$  bricks, Ans.
10.  $80 + 40 = 120$ ;  $120 \times 2 = 240$  feet round the house; from this sum we deduct 4 feet for the corners;  $240 - 4 = 236$ ;  $236 \times 25 \times 27 = 159300$  bricks, Ans.
11.  $18 \times 12 \times 144 = 31104$ , number of square inches in the floor;  $8 \times 8 = 64$  square inches in a tile;  $31104 \div 64 = 486$  tiles, Ans.
12.  $11\text{cwt. } 3\text{qr. } 19\text{lb.} = 1335\text{lb.}$ ;  $83\text{cwt. } 2\text{qr. } 11\text{lb.} = 9363\text{lb.}$ ;  
 $1335\text{lb.} : 9363\text{lb.} \left. \begin{array}{l} 46\text{m.} : 96\text{m.} \end{array} \right\} :: \$18.25 : \$267.12\frac{45}{100} \frac{8}{100}$   
 $9363 \times 96 \times 18.25 = 16403976.00$ ;  $1335 \times 46 = 61410$ ;  $16403976 \div 61410 = \$267.12\frac{45}{100} \frac{8}{100} \text{ Ans.}$
13.  $\$100 - \$25 = \$75$ ;  $\$75 : \$100 :: \$24 : 32$ , value of the cloth;  $\$34 - \$32 = \$2$ ;  $\$32 : \$2 :: \$100 : \$6\frac{1}{4} \text{ Ans.}$
14.  $120 - 20 = 100$  gallons remaining;  $\$30 + \$10 = \$40$ , price to be obtained;  $100\text{gals.} : 1\text{gal.} :: \$40 : \$0.40 \text{ Ans.}$
15.  $117\frac{3}{4} = 82\frac{2}{3}$ ;  $112\frac{2}{3} = 10\frac{10}{9}$ ;  $82\frac{2}{3} \times 10\frac{10}{9} = 830\frac{220}{9} = 13178\frac{2}{3}$  rods = 82A. 1R. 18p. 2yd. 7ft.  $133\frac{1}{2}\text{in.}$  Ans.
16.  $\$128.25 \times 1.03 = \$132.0975$ ;  $\$132.0975 \times 1.06 = \$140.02\frac{1}{2} \text{ Ans.}$
17.  $27\text{bu.} : 36\text{bu.} :: \$8.75 : \$11.66\frac{1}{2} \text{ Ans.}$
18.  $\$1.25 \times 93 = \$116.25$ ;  $\$116.25 \div \$0.50 = 232\frac{1}{2}$  bushels, Ans. [Ans.]
19.  $\$1.25 \times 75 = \$93.75$ ;  $\$93.75 \div 1.30 = 72\frac{3}{8}$  bushels,
20.  $\frac{1}{3}$  of 24h. = 8h.;  $\frac{1}{4}$  of 24h. = 6h.;  $8 + 6 + 2 + 6 = 22\text{h.}$ ;  $24\text{h.} - 22\text{h.} = 2$  hours, Ans.
21.  $\frac{1}{4}$  of 24h. = 6h.;  $\frac{1}{5}$  of 24h. =  $4\frac{4}{5}\text{h.}$ ;  $\frac{1}{6}$  of 24h. = 4h.;  $\frac{1}{7}$  of 24h. =  $3\frac{3}{7}\text{h.}$ ;  $6 + 4\frac{4}{5} + 4 + 3\frac{3}{7} + 2 = 20\frac{3}{5}\text{h.}$ ;  $24\text{h.} - 20\frac{3}{5}\text{h.} = 3\frac{3}{5}\text{h.}$  hours, Ans.

$$22. 7\frac{2}{3} = \frac{22}{3}; 5\frac{1}{2} = \frac{11}{2}; \frac{22}{3} \times \frac{11}{2} = \frac{242}{6} = 40\frac{2}{3}; 160\text{rd.} : 40\frac{2}{3}\text{rd.}$$

$$\therefore \$ 25.75 : \frac{1}{160} \times \frac{1860}{45} \times \frac{103}{1} = 2\frac{1}{2} = 2.5 = \$ 6.65\frac{1}{2},$$

[Ans.]

$$(23.) 5\frac{2}{3}\text{E.E.} : 71\frac{1}{2}\text{yd.} :: \$ 15.16$$

$$\begin{array}{r} 5 \\ 28 \\ \hline 15.16 \\ 1722 \\ 287 \\ 1435 \\ 287 \end{array}$$

$$28)4350.92(\$ 155.39 \text{ Ans.})$$

$$24. 5\frac{1}{2}\text{ft.} : 4\text{ft.} :: 150\text{ft.} : 107\frac{1}{2}\text{ feet, Ans.}$$

$$25. \$ 100 : \$ 150 :: 6\text{m.} : 9\text{m. Ans.}$$

$$26. \$ 1.20 \times 150 = \$ 180.00, \text{ sum paid by the polls;}$$

$$\$ 6045.50 - \$ 180.00 = \$ 5865.50 \text{ to be paid on valuation;}$$

$$\$ 293275 : \$ 5865.50 :: \$ 1.00 : \$ 0.02 \text{ on a dollar;}$$

$$\$ 1.00 : \$ 0.02 :: \$ 3675 : \$ 73.50; \$ 1.20 \times 4 =$$

$$\$ 4.80; \$ 4.80 + \$ 73.50 = \$ 78.30 \text{ Ans.}$$

$$27. 2\text{cwt. } 3\text{qr. } 11\text{lb.} = 319\text{lb.}; 319\text{lb.} \times 97 = 30943\text{lb.};$$

$$3\text{£. } 17\text{s. } 9\text{d.} = 933\text{d.}; 112\text{lb.} : 30943\text{lb.} :: 933\text{d.} :$$

$$257766\frac{2}{3}\text{d.}; 257766\frac{2}{3}\text{d.} = 1074\text{£. } 0\text{s. } 6\frac{2}{3}\text{d. Ans.}$$

(28.)

$$\begin{array}{r} \text{y.} \quad \text{mo.} \quad \text{d.} \\ 1842 \quad 9 \quad 29 \quad \$ 17.86 \\ 1840 \quad 1 \quad 9 \quad .163\frac{1}{2} \\ \hline 2 \quad 8 \quad 20 \quad 5350 \\ 10716 \\ 1786 \\ 595 \\ 29.1713 \\ 7\frac{1}{2} \\ 204.1991 \\ 7.2928 \\ 6)211.4919 \\ \hline \text{Ans. } \$ 35.24,76 \end{array}$$

(29.)

$$\begin{array}{r} \text{y.} \quad \text{mo.} \quad \text{d.} \\ 1842 \quad 8 \quad 25 \quad \$ 97.87 \\ 1840 \quad 0 \quad 7 \quad .163 \\ \hline 2 \quad 8 \quad 18 \quad 29361 \\ 58722 \\ 9787 \\ 15.95281 \\ 9 \\ 6)143.57529 \\ \hline \text{Ans. } \$ 23.92,921 \end{array}$$

30.  $30 \times 30 = 900$ ;  $900 \div 3 = 300$ ;  $\sqrt{300}$  = length of one side of the cube;  $\sqrt{300} \times \sqrt{300} \times 6 = 1800$  inches, Ans.

(31.)

Principal bearing interest from Oct. 29, 1836, . . . \$ 1000.00

Compound interest on \$ 1000 from Oct. 29, 1836,  
to Oct. 29, 1842, 6 years, . . . . . 418.51

Amount of principal to Oct. 29, 1842, . . . . . 1418.51

First payment, Jan. 1, 1837, . . . \$ 125.00

Compound interest from Jan. 1, 1837, to  
Oct. 29, 1842, 5y. 9m. 28d., . . . . . 50.58

Second payment, June 5, 1837, . . . . . 316.00

Compound interest from June 5, 1837,  
to Oct. 29, 1842, 5y. 4m. 24d., . . . . . 117.02

Third payment, Sept. 25, 1837, . . . . . 417.00

Compound interest from Sept. 25, 1837,  
to Oct. 29, 1842, 5y. 1m. 4d., . . . . . 144.20

Fourth payment, April 1, 1838, . . . . . 100.00

Compound interest from April 1, 1838,  
to Oct. 29, 1842, 4y. 6m. 28d., . . . . . 30.62

Fifth payment, July 5, 1838, . . . . . 50.00

Compound interest from July 5, 1838, to  
Oct. 29, 1842, 4y. 3m. 24d., . . . . . 14.30

Amount of indorsements, . . . . . \$ 1364.72

Balance due Oct. 29, 1842, . . . . . \$ 53.79

32.  $23\frac{1}{2} = 1\frac{1}{2}$ ;  $16\frac{1}{2} = \frac{3}{2}$ ;  $1\frac{1}{2} \times \frac{3}{2} = \frac{5}{2} = 2\frac{1}{2}$ ;  $23\frac{1}{2} \times 2 = 47$ ;  $47 \times 2 = 94$ ;  $94 \times 2 = 188$ ;  $188 \times 2 = 376$ ;  $376 \times 2 = 752$ ;  $752 \times 2 = 1504$ ;  $1504 \times 2 = 3008$ ;  $3008 \times 2 = 6016$ ;  $6016 \times 2 = 12032$ ;  $12032 \times 2 = 24064$ ;  $24064 \times 2 = 48128$ ;  $48128 \times 2 = 96256$ ;  $96256 \times 2 = 192512$ ;  $192512 \times 2 = 385024$ ;  $385024 \times 2 = 770048$ ;  $770048 \times 2 = 1540096$ ;  $1540096 \times 2 = 3080192$ ;  $3080192 \times 2 = 6160384$ ;  $6160384 \times 2 = 12320768$ ;  $12320768 \times 2 = 24641536$ ;  $24641536 \times 2 = 49283072$ ;  $49283072 \times 2 = 98566144$ ;  $98566144 \times 2 = 197132288$ ;  $197132288 \times 2 = 394264576$ ;  $394264576 \times 2 = 788529152$ ;  $788529152 \times 2 = 1577058304$ ;  $1577058304 \times 2 = 3154116608$ ;  $3154116608 \times 2 = 6308233216$ ;  $6308233216 \times 2 = 12616466432$ ;  $12616466432 \times 2 = 25232932864$ ;  $25232932864 \times 2 = 50465865728$ ;  $50465865728 \times 2 = 100931731456$ ;  $100931731456 \times 2 = 201863462912$ ;  $201863462912 \times 2 = 403726925824$ ;  $403726925824 \times 2 = 807453851648$ ;  $807453851648 \times 2 = 1614907703296$ ;  $1614907703296 \times 2 = 3229815406592$ ;  $3229815406592 \times 2 = 6459630813184$ ;  $6459630813184 \times 2 = 12919261626368$ ;  $12919261626368 \times 2 = 25838523252736$ ;  $25838523252736 \times 2 = 51677046505472$ ;  $51677046505472 \times 2 = 103354093010944$ ;  $103354093010944 \times 2 = 206708186021888$ ;  $206708186021888 \times 2 = 413416372043776$ ;  $413416372043776 \times 2 = 826832744087552$ ;  $826832744087552 \times 2 = 1653665488175104$ ;  $1653665488175104 \times 2 = 3307330976350208$ ;  $3307330976350208 \times 2 = 6614661952700416$ ;  $6614661952700416 \times 2 = 13229323905400832$ ;  $13229323905400832 \times 2 = 26458647810801664$ ;  $26458647810801664 \times 2 = 52917295621603328$ ;  $52917295621603328 \times 2 = 105834591243206656$ ;  $105834591243206656 \times 2 = 211669182486413312$ ;  $211669182486413312 \times 2 = 423338364972826624$ ;  $423338364972826624 \times 2 = 846676729945653248$ ;  $846676729945653248 \times 2 = 1693353459891306496$ ;  $1693353459891306496 \times 2 = 3386706919782612992$ ;  $3386706919782612992 \times 2 = 6773413839565225984$ ;  $6773413839565225984 \times 2 = 13546827679130451968$ ;  $13546827679130451968 \times 2 = 27093655358260903936$ ;  $27093655358260903936 \times 2 = 54187310716521807872$ ;  $54187310716521807872 \times 2 = 108374621433043615744$ ;  $108374621433043615744 \times 2 = 216749242866087231488$ ;  $216749242866087231488 \times 2 = 433498485732174462976$ ;  $433498485732174462976 \times 2 = 866996971464348925952$ ;  $866996971464348925952 \times 2 = 1733993942928697851904$ ;  $1733993942928697851904 \times 2 = 3467987885857395703808$ ;  $3467987885857395703808 \times 2 = 6935975771714791407616$ ;  $6935975771714791407616 \times 2 = 13871951543429582815232$ ;  $13871951543429582815232 \times 2 = 27743903086859165630464$ ;  $27743903086859165630464 \times 2 = 55487806173718331260928$ ;  $55487806173718331260928 \times 2 = 110975612347436662521856$ ;  $110975612347436662521856 \times 2 = 221951224694873325043712$ ;  $221951224694873325043712 \times 2 = 443902449389746650087424$ ;  $443902449389746650087424 \times 2 = 887804898779493300174848$ ;  $887804898779493300174848 \times 2 = 1775609797558986600349696$ ;  $1775609797558986600349696 \times 2 = 3551219595117973200699392$ ;  $3551219595117973200699392 \times 2 = 7102439190235946401398784$ ;  $7102439190235946401398784 \times 2 = 14204878380471892802797568$ ;  $14204878380471892802797568 \times 2 = 28409756760943785605595136$ ;  $28409756760943785605595136 \times 2 = 56819513521887571211190272$ ;  $56819513521887571211190272 \times 2 = 113639027043775142422380544$ ;  $113639027043775142422380544 \times 2 = 227278054087550284844761088$ ;  $227278054087550284844761088 \times 2 = 454556108175100569689522176$ ;  $454556108175100569689522176 \times 2 = 909112216350201139379044352$ ;  $909112216350201139379044352 \times 2 = 1818224432700402278758088704$ ;  $1818224432700402278758088704 \times 2 = 3636448865400804557516177408$ ;  $3636448865400804557516177408 \times 2 = 7272897730801609115032354816$ ;  $7272897730801609115032354816 \times 2 = 14545795461603218230064709632$ ;  $14545795461603218230064709632 \times 2 = 29091590923206436460129419264$ ;  $29091590923206436460129419264 \times 2 = 58183181846412872920258838528$ ;  $58183181846412872920258838528 \times 2 = 116366363692825745840517677056$ ;  $116366363692825745840517677056 \times 2 = 232732727385651491681035354112$ ;  $232732727385651491681035354112 \times 2 = 465465454771302983362070708224$ ;  $465465454771302983362070708224 \times 2 = 930930909542605966724141416448$ ;  $930930909542605966724141416448 \times 2 = 1861861819085211933448282832896$ ;  $1861861819085211933448282832896 \times 2 = 3723723638170423866896565665792$ ;  $3723723638170423866896565665792 \times 2 = 7447447276340847733793131331584$ ;  $7447447276340847733793131331584 \times 2 = 14894894552681695467586262663168$ ;  $14894894552681695467586262663168 \times 2 = 29789789105363390935172525326336$ ;  $29789789105363390935172525326336 \times 2 = 59579578210726781870345050652672$ ;  $59579578210726781870345050652672 \times 2 = 119159156421453563740690101305344$ ;  $119159156421453563740690101305344 \times 2 = 238318312842907127481380202610688$ ;  $238318312842907127481380202610688 \times 2 = 476636625685814254962760405221376$ ;  $476636625685814254962760405221376 \times 2 = 953273251371628509925520810442752$ ;  $953273251371628509925520810442752 \times 2 = 1906546502743257019851041620885504$ ;  $1906546502743257019851041620885504 \times 2 = 3813093005486514039702083241771008$ ;  $3813093005486514039702083241771008 \times 2 = 7626186010973028079404166483542016$ ;  $7626186010973028079404166483542016 \times 2 = 15252372021946056158808332967084032$ ;  $15252372021946056158808332967084032 \times 2 = 30504744043892112317616665934168064$ ;  $30504744043892112317616665934168064 \times 2 = 61009488087784224635233331868336128$ ;  $61009488087784224635233331868336128 \times 2 = 122018976175568449270466663736672256$ ;  $122018976175568449270466663736672256 \times 2 = 244037952351136898540933327473344512$ ;  $244037952351136898540933327473344512 \times 2 = 488075904702273797081866654946689024$ ;  $488075904702273797081866654946689024 \times 2 = 976151809404547594163733309893378048$ ;  $976151809404547594163733309893378048 \times 2 = 1952303618809095188327466619786756096$ ;  $1952303618809095188327466619786756096 \times 2 = 3904607237618190376654933239573512192$ ;  $3904607237618190376654933239573512192 \times 2 = 7809214475236380753309866479147024384$ ;  $7809214475236380753309866479147024384 \times 2 = 15618428950472761506619732958294048768$ ;  $15618428950472761506619732958294048768 \times 2 = 31236857900945523013239465916588097536$ ;  $31236857900945523013239465916588097536 \times 2 = 62473715801891046026478931833176195072$ ;  $62473715801891046026478931833176195072 \times 2 = 124947431603782092052957863666352390144$ ;  $124947431603782092052957863666352390144 \times 2 = 249894863207564184105915727332704780288$ ;  $249894863207564184105915727332704780288 \times 2 = 499789726415128368211831454665409560576$ ;  $499789726415128368211831454665409560576 \times 2 = 999579452830256736423662909330819121152$ ;  $999579452830256736423662909330819121152 \times 2 = 1999158905660513472847325818661638242304$ ;  $1999158905660513472847325818661638242304 \times 2 = 3998317811321026945694651637323276484608$ ;  $3998317811321026945694651637323276484608 \times 2 = 7996635622642053891389303274646552969216$ ;  $7996635622642053891389303274646552969216 \times 2 = 15993271245284107782778606549293105938432$ ;  $15993271245284107782778606549293105938432 \times 2 = 31986542490568215565557213098586211876864$ ;  $31986542490568215565557213098586211876864 \times 2 = 63973084981136431131114426197172423753728$ ;  $63973084981136431131114426197172423753728 \times 2 = 127946169962272862262228852394344847507456$ ;  $127946169962272862262228852394344847507456 \times 2 = 255892339924545724524457704788689695014912$ ;  $255892339924545724524457704788689695014912 \times 2 = 511784679849091449048915409577379390029824$ ;  $511784679849091449048915409577379390029824 \times 2 = 1023569359698182898097830819154758780059648$ ;  $1023569359698182898097830819154758780059648 \times 2 = 2047138719396365796195661638309517560119296$ ;  $2047138719396365796195661638309517560119296 \times 2 = 4094277438792731592391323276619035120238592$ ;  $4094277438792731592391323276619035120238592 \times 2 = 8188554877585463184782646553238070240477184$ ;  $8188554877585463184782646553238070240477184 \times 2 = 16377109755170926369565293106476140480954368$ ;  $16377109755170926369565293106476140480954368 \times 2 = 32754219510341852739130586212952280961908736$ ;  $32754219510341852739130586212952280961908736 \times 2 = 65508439020683705478261172425904561923817472$ ;  $65508439020683705478261172425904561923817472 \times 2 = 131016878041367410956522344851809123847634944$ ;  $131016878041367410956522344851809123847634944 \times 2 = 262033756082734821913044689703618247695269888$ ;  $262033756082734821913044689703618247695269888 \times 2 = 524067512165469643826089379407236495390539776$ ;  $524067512165469643826089379407236495390539776 \times 2 = 1048135024330939287652178758814472990781079552$ ;  $1048135024330939287652178758814472990781079552 \times 2 = 2096270048661878575304357517628945981562159104$ ;  $2096270048661878575304357517628945981562159104 \times 2 = 4192540097323757150608715035257891963124318208$ ;  $4192540097323757150608715035257891963124318208 \times 2 = 8385080194647514301217430070515783926248636416$ ;  $8385080194647514301217430070515783926248636416 \times 2 = 16770160389295028602434860141031567852497272832$ ;  $16770160389295028602434860141031567852497272832 \times 2 = 33540320778590057204869720282063135704994545664$ ;  $33540320778590057204869720282063135704994545664 \times 2 = 67080641557180114409739440564126271409989091328$ ;  $67080641557180114409739440564126271409989091328 \times 2 = 134161283114360228819478881128252542819978182656$ ;  $134161283114360228819478881128252542819978182656 \times 2 = 268322566228720457638957762256505085639956365312$ ;  $268322566228720457638957762256505085639956365312 \times 2 = 536645132457440915277915524513010171279912730624$ ;  $536645132457440915277915524513010171279912730624 \times 2 = 1073290264914881830555831049026020342559825461248$ ;  $1073290264914881830555831049026020342559825461248 \times 2 = 2146580529829763661111662098052040685119650922496$ ;  $2146580529829763661111662098052040685119650922496 \times 2 = 4293161059659527322223324196104081370239301844992$ ;  $4293161059659527322223324196104081370239301844992 \times 2 = 8586322119319054644446648392208162740478603689984$ ;  $8586322119319054644446648392208162740478603689984 \times 2 = 17172644238638109288893296784416325480957207379968$ ;  $17172644238638109288893296784416325480957207379968 \times 2 = 34345288477276218577786593568832650961914414759936$ ;  $34345288477276218577786593568832650961914414759936 \times 2 = 68690576954552437155573187137665301923828829519872$ ;  $68690576954552437155573187137665301923828829519872 \times 2 = 137381153909104874311146374275330603847657659039744$ ;  $137381153909104874311146374275330603847657659039744 \times 2 = 274762307818209748622292748550661207695315318079488$ ;  $274762307818209748622292748550661207695315318079488 \times 2 = 549524615636419497244585497101322415390630636158976$ ;  $549524615636419497244585497101322415390630636158976 \times 2 = 1099049231272838994489170994202644830781261272317952$ ;  $1099049231272838994489170994202644830781261272317952 \times 2 = 2198098462545677988978341988405289661562522544635904$ ;  $21980984$

34.  $15\frac{1}{2} \times 12 = 186\text{in.}$ ;  $11\frac{1}{4} \times 12 = 135\text{in.}$ ;  $7\frac{3}{4} \times 12 = 93\text{in.}$ ;  $186 + 135 = 321$ ;  $321 \times 2 = 642$ ;  $642 \times 93 = 59706$  square inches;  $59706 \div 30 = 1990\frac{1}{5}$ ;  $1990\frac{1}{5} \div 36 = 55\frac{1}{5}\frac{1}{2}\text{yd.}$  Ans.
35.  $15\frac{1}{2} + 11\frac{1}{4} = 26\frac{3}{4}$ ;  $26\frac{3}{4} \times 2 = 53\frac{1}{2} = 127$ ;  $7\frac{3}{4} = 31$ ;  $127 \times 31 = 3937$ ;  $15\frac{1}{2} = 31$ ;  $11\frac{1}{4} = 45$ ;  $45 \times 31 = 1395$ ;  $3937 + 1395 = 5332$  square feet;  $5332 \div 9 = 65\frac{1}{3}$  square yards;  $65\frac{1}{3} \times 10 = \$6.54\frac{1}{3}$  Ans.
36.  $40 \times 40 = 1600$ ;  $1600 \div 3 = 533.33\frac{1}{3}$ ;  $\sqrt{533.33\frac{1}{3}} = 23.09401$ ;  $533.33\frac{1}{3} \times 23.09401 = 12316.8 +$  Ans.
37.  $32 : 4 :: 18.5^3 : 791.453125$ ;  $\sqrt[3]{791.453125} = 9.25 = 9\frac{1}{4}$  inches wide;  $32 : 4 :: 8^3 : 64$ ;  $\sqrt[3]{64} = 4$  inches deep, Ans.
38. As  $\frac{1}{3}$  of the estate was given to the wife,  $\frac{2}{3}$  of the estate will remain. The eldest son has  $\frac{1}{4}$  of the  $\frac{2}{3} = \frac{1}{6}$ . The wife and son will therefore have  $\frac{1}{3} + \frac{1}{6} = \frac{1}{2}$  of the estate. The daughter is to have  $\frac{1}{3}$  of the residue; that is,  $\frac{1}{3}$  of  $\frac{1}{2} = \frac{1}{6}$ . Therefore the wife, son, and daughter, will have  $\frac{1}{3}$ ,  $\frac{1}{6}$ , and  $\frac{1}{6} = \frac{1}{2}$ ; and  $\frac{1}{2} - \frac{1}{2} = 0$  will remain to be divided among the other heirs. But, if  $\frac{1}{6}$ , the daughter's portion, is \$151.33 $\frac{1}{3}$ , the residue, will be 5 times as much, that is, 5 times \$151.33 $\frac{1}{3}$  = \$756.66 $\frac{2}{3}$  Ans.

## OPERATION.

$$\frac{1}{6} : \frac{1}{6} :: \$151.33\frac{1}{3} : \$756.66\frac{2}{3} \text{ Ans.}$$

39. If the son receives  $\frac{1}{4}$ , there will remain  $\frac{2}{3} - \frac{1}{4} = \frac{5}{12}$ ; and  $\frac{1}{3}$  of  $\frac{5}{12} = \frac{5}{36}$  will be the daughter's portion. The son and daughter will receive  $\frac{1}{4} + \frac{5}{36} = \frac{11}{36} = \frac{2}{9}$  of the estate; there will therefore remain  $\frac{2}{3} - \frac{2}{9} = \frac{4}{9}$  for the wife; and the son will receive  $\frac{1}{4} - \frac{5}{36} = \frac{1}{9}$  more than the daughter; therefore,  $\frac{1}{9} : \frac{2}{9} :: \$100 : \$200$ , wife's portion, Ans.
40. \$1250 — \$500 = \$750, which was  $\frac{2}{3}$  of his capital. He therefore lost  $\$750 \div 3 = \$250$  Ans.
41.  $\frac{1}{3}$  of  $\frac{1}{3} = \frac{1}{9}$ ;  $\frac{1}{3} - \frac{1}{9} = \frac{2}{9}$  Ans.
42. \$112.50 : \$100 :: \$50 : \$44.44 $\frac{1}{2}$  Ans.

43. 17cwt. 3qr. 18lb. = 2006lb.;  $2006 \times 7\frac{1}{2} = 15045d.$ ;  
 $15045d. = 63s. 13s. 9d. = \$208.95\frac{3}{4}$  Ans.
44.  $\$5.00 : \$17.50 :: \frac{3}{11}yd. : \frac{2}{3}yd.$  Ans.
45. 17rd. 10ft. =  $290\frac{1}{2}ft.$ ;  $8\frac{1}{2} = 4\frac{1}{5}h.$ ; therefore,  $\frac{7}{11}h. : 4\frac{1}{5}h. ::$   
 $290\frac{1}{2}ft. : 6208\frac{2}{5}ft. = 1m. 928\frac{2}{5}ft.$  Ans.
46.  $\$11.75 : \$100 :: 2\frac{3}{4}A. : 19A. 1R. 32\frac{1}{2}\frac{5}{8}p.$  Ans.
47.  $\$128 - \$70 = \$58$ ;  $\$58 : \$70 :: \$1000 :$   
 $\$1206.89\frac{1}{2}\frac{2}{5}$  Ans.
48.  $\$1.218\frac{1}{2} : \$1.00 :: \$1000 : \$820.79\frac{7}{8}\frac{1}{4}$  Ans.
49.  $\$97.57 - \$88 = \$9.57$ .  
 $\$88 : \$100 \}$   $:: \$9.57 : \$7\frac{1}{4}$   
 $18m. : 12m. \}$   
 $\frac{\$9.57 \times 1000 \times 12}{18 \times 88} = \frac{11484}{1584} = 7\frac{1}{4}$  per cent., Ans.
50.  $\frac{3}{4}gal. : 7\frac{1}{2}gal. :: \$87 = \frac{3}{4} : \frac{3}{4} :: \frac{87}{1} = \frac{3}{4} \times \frac{3}{4} \times \frac{87}{1} =$   
 $\frac{12615}{12} = \$1051.25$  Ans.
51.  $18\frac{3}{4}yd. : 5yd. :: \$71 = \frac{172}{1} : \frac{5}{1} :: \frac{71}{1} = \frac{172}{1} \times \frac{5}{1} \times \frac{71}{1} =$   
 $\frac{2445}{12} = \$19.26\frac{1}{2}\frac{5}{8}$  Ans.
52. 18 tons 17cwt. 3qr. = 42308lb.; 112lb. : 42308lb. ::  $\$9.50$   
 $: \$3588\frac{5}{8}$ ;  $\$4.00 : \$3588\frac{5}{8} :: 1yd. : 897\frac{5}{8}yd.$  Ans.
53. 1bu. : 98bu. ::  $\$0.45 : \$44.10$ ;  $\$1.25 : \$44.10 :: 1bu. :$   
 $35\frac{7}{5}bu.$  Ans.
54. 86 tons 18cwt. 3qr. 20lb. = 194760lb.; 2240lb. : 194760lb.  
 $:: \$8.50 : \$739.04\frac{1}{2}\frac{3}{8} = 19A. 2R. 33\frac{9}{8}p.$  Ans.
55. By the question, we find  $\frac{1}{4}$  of the time passed from noon  
equal to  $\frac{1}{11}$  of the time to midnight. We reduce these  
fractions to a common denominator,  $\frac{1}{4}$  and  $\frac{1}{11} = \frac{1}{44}$  and  
 $\frac{7}{11}$ . When fractions are reduced to a common denom-  
inator, their value is as their numerators. Therefore 11  
will represent the time passed from noon, and 7 the time  
to midnight, and  $11 + 7 = 18$  will represent 12 hours;  
therefore  $7 : 18 :: 12h. : 4h. 40m.$  time from noon, Ans.
56.  $200 \times 4 \times 40 \times 272\frac{1}{2} \times 20 = 174,240,000$  feet, Ans.
57.  $20000 \times 4 \times 40 \times 272\frac{1}{2} \times 144 \times 3 = 376358400000$   
cubic inches;  $376358400000 \div 282 = 1334604255\frac{1}{4}\frac{1}{4}$

gallons;  $1334604255 \frac{4}{141} \div 100 = 13346042 \text{ hhd. } 55 \text{ gal.};$

$\frac{4}{141} \text{ gal.} = 1 \text{ qt. } 0 \text{ pt. } 2 \frac{1}{2} \text{ gi. Ans.}$

58.  $1^\circ : 71^\circ 4' :: 4 \text{ min.} : 4 \text{ h. } 44 \text{ m. } 16 \text{ sec.}$

| h. | m. | sec. |
|----|----|------|
| 11 | 16 | 0    |
| 4  | 44 | 16   |
|    |    |      |

Ans. 6 31 44

(59.)  
 $18^\circ \quad 24' \text{ E.}$   
 $67^\circ \quad 21' \text{ W.}$

$1^\circ : 85^\circ 45' :: 4 \text{ m.}$

$$\begin{array}{r} 60 \\ 60 \end{array}$$

$$\begin{array}{r} 60 \\ 5145 \end{array}$$

$$\begin{array}{r} 4 \end{array}$$

$$60 \overline{) 20580}$$

$$60 \overline{) 343 \text{ m.}}$$

| h. | m.       |
|----|----------|
| 2  | 36 A. M. |

| h. | m. |
|----|----|
| 5  | 43 |

5h. 43m. 8 53 P. M. Ans.

NOTE. To perform this question we are obliged to add 12 hours to the minuend, and it brings the time to the evening of the previous day.

| h. | m. |
|----|----|
| 12 | 0  |
| 11 | 36 |
|    |    |

$4 \text{ m.} : 24 \text{ m.} :: 1^\circ$

$$\begin{array}{r} 1 \\ 4 \overline{) 24} (6^\circ \\ 24 \end{array}$$

|                       |                       |    |
|-----------------------|-----------------------|----|
| $\overset{\circ}{16}$ | $\overset{\circ}{18}$ | W. |
| 6                     | 0                     |    |
|                       |                       |    |
| 10                    | 18                    | W. |

61.  $3000 \times 5280 = 15840000$ ;  $15840000 \div 1142 = 13870 +$   
seconds;  $13870 \div 60 = 231 \text{ m. } 10 \text{ sec.}; 231 \div 60 =$   
3h. 51m.; 3h. 51m. 10+ sec. Ans.

62.  $1142 \times 10 = 11420$ ;  $11420 \div 5280 = 2 \text{ m. } 860 \text{ ft. Ans.}$

63.  $2^\circ = 8 : 3^\circ = 27 :: \$ 125.00 : \$ 421.87 \frac{1}{2} \text{ Ans.}$

64.  $20 - 15 = 5 : 15 :: 10 : 30 \text{ cents, Ans.}$

65.  $12 \frac{1}{2} - 10 = 2 \frac{1}{2}$ ;  $10 : 2 \frac{1}{2} :: 100 : 25 \text{ per cent.}; 19 - 15$   
 $= 4$ ;  $15 : 4 :: 100 : 26 \frac{2}{3} \text{ per cent.}; 26 \frac{2}{3} - 25 = 1 \frac{2}{3}$   
per cent., which Y makes more than Q.

66. From Sept. 25 to Jan. 1 are 97 days = 139680 minutes.  
From 23 minutes past 3 A. M. to midnight is 20h. 33m.



= 1233 minutes. From Jan. 1, 1787, to Jan. 1, 1844, are 57 years =  $365 \times 57 \times 24 \times 60 = 29959200$  minutes. From Jan. 1, 1844, to July 4, 1844, are 185 days =  $185 \times 24 \times 60 = 266400$  minutes. From Jan. 1, 1787, to Jan. 1, 1844, are 13 leap years; we have, therefore, to add the number of minutes in 13 days,  $13 \times 24 \times 60 = 18720$  minutes. To these we add the minutes from 30 minutes past 5 A. M. to midnight = 1050 min.

139680

1233

29959200

266400

18720

1050

Ans. 30386283 minutes.

NOTE. We have reckoned but 13 leap years from Jan. 1, 1787, to Jan. 1, 1844, because 1800 was not a leap year.

(67.)

|    |   |    |    |    |
|----|---|----|----|----|
| S. | 3 | 14 | 26 | 14 |
|    | 8 | 19 | 43 | 28 |

Ans. 6 24 42 46

NOTE. As the moon is east of the star, and is also moving eastward in her orbit, we must add 12 signs to the minuend.

(68.)

|    |    |    |     |
|----|----|----|-----|
| A. | R. | p. | ft. |
| 3  | 1  | 23 | 200 |
| 1  | 2  | 37 |     |

We first reduce the 200 feet in the minuend to yards and feet,  $200 \div 9 = 22\text{yd. } 2\text{ft.}$

|    |    |    |     |     |     |
|----|----|----|-----|-----|-----|
| A. | R. | p. | yd. | ft. | in. |
| 3  | 1  | 23 | 22  | 2   | 0   |
| 1  | 2  | 37 | 30  | 8   | 0   |

|   |   |    |                   |    |    |
|---|---|----|-------------------|----|----|
| 1 | 2 | 25 | 21 $\frac{1}{2}$  | 3  | 0  |
|   |   |    | $\frac{1}{2} = 2$ | 36 |    |
| 1 | 2 | 25 | 21                | 5  | 36 |

(69.)

$$\frac{5}{9} \div \frac{3}{4} = \frac{5}{9} \times \frac{4}{3} = \frac{20}{27} \text{ Ans.}$$

(70.)

|    |    |    |                  |
|----|----|----|------------------|
| £. | s. | d. | qr.              |
| 1  | 19 | 11 | 3                |
| 1  | 19 | 11 | 3                |
| 1  | 19 | 11 | 3                |
| 1  | 17 | 11 | 3 $\frac{1}{2}$  |
|    | 1  | 9  | 3 $\frac{1}{2}$  |
|    |    | 1  | 18 $\frac{1}{2}$ |

Ans. 3 19 11 0 $\frac{1}{2}$ 

NOTE. The first product is obtained by multiplying the multiplicand by 1, the second product by multiplying it by  $\frac{1}{2}$ , the third product by multiplying by  $\frac{1}{4}$ , and the fourth product by multiplying by  $\frac{3}{4}$ .

71. \$ 100 — \$ 40 = \$ 60; \$ 60 : \$ 100 : : \$ 68.75 :  
\$ 114.58½ Ans.
72. \$ 134.40 — \$ 120 = \$ 14.40; \$ 120 : \$ 14.40 :: \$ 100  
: \$ 12 per cent., Ans.
73. \$ 3600 + \$ 4200 + \$ 2200 = \$ 10000; \$ 15000 × .15  
= \$ 2250; \$ 15000 — \$ 2250 = \$ 12750; \$ 12750 —  
\$ 10000 = \$ 2750; \$ 10000 : \$ 2750 :: \$ 36000 : \$ 990,  
Emerson's gain; \$ 10000 : \$ 2750 :: \$ 4200 : \$ 1155,  
Bailey's gain; \$ 10000 : \$ 2750 :: \$ 2200 : \$ 605, Cur-  
tis's gain.
74. 3½ in. × 2 = 7 in.; 4 ft. 9 in. = 57 in.; 3 ft. 7 in. = 43 in.;  
2 ft. 11 in. = 35 in.; 43 × 2 = 86; 43 — 7 = 36; 35 —  
7 = 28; 86 × 57 = 4902; 28 × 2 = 56; 56 × 57 =  
3192; 36 × 28 × 2 = 2016; 4902 + 3192 + 2016 =  
10110; 10110 ÷ 144 = 70½ square feet; 57 — 7 =  
50; 43 — 7 = 36; 35 — 7 = 28; 50 × 36 × 28 =  
50400; 50400 ÷ 1728 = 29½ cubic feet, Ans.
75. 64 × 2 = 128 ft.; 32 × 2 = 64 ft. From 64 ft. we subtract  
four times the thickness of the wall; 1 ft. 4 in. × 4 = 5 ft.  
4 in.; 64 ft. — 5 ft. 4 in. = 58 ft. 8 in.; 128 ft. + 58 ft. 8 in.  
= 186 ft. 8 in. = length of the wall of the house.

| ft.    | in. | ft. | in. | ft.   | in. | ft. | in.                        |
|--------|-----|-----|-----|-------|-----|-----|----------------------------|
| 186    | 8   | 7   | 4   | 2     | 8   | 3   | 8                          |
|        | 4   |     | 3   |       | 5   |     | 6                          |
| 746    | 8   | 22  | 0   | 13    | 4   | 18  | 32                         |
|        | 7   |     | 3   |       | 1   |     | 14                         |
| 3)5226 | 8   | 66  | 0   | 15    | 1   | 72  | 64                         |
| 1742   | 2   | 14  | 8   |       | 4   | 18  | <sup>cubic</sup><br>inches |
| 6968   | 10  | 80  | 8   | 60    | 5   | 252 | [in a brick.               |
| 765    | 11  |     |     |       | 4   |     |                            |
| 6202   | 11  |     |     | 241   | 9   |     |                            |
| 12     |     |     |     | 80    | 8   |     |                            |
| 74435  |     |     |     | 252   |     |     |                            |
| 12     |     |     |     | 3)574 | 5   |     |                            |
| 893226 |     |     |     | 191   | 5   |     |                            |
| 12     |     |     |     | 765   | 11  |     |                            |

64)10718720(167,480 bricks, Ans.

76.  $\frac{1}{2}$  and  $\frac{1}{4} = \frac{1}{2}$  and  $\frac{1}{4}$ ;  $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$ ;  $\frac{1}{2} : \frac{1}{4} :: \$1000 :$   
 $\$571.42\frac{2}{3}$ , Benjamin's share;  $\frac{1}{2} : \frac{3}{4} :: \$1000 :$   
 $\$428.57\frac{1}{3}$ , Samuel's share.
77. As Bailey occupied the whole house the first three months, he must pay  $\frac{1}{3}$  of  $\$100 = \$33\frac{1}{3}$ . As he occupied half of the next 3 months he must pay half of  $\$33\frac{1}{3} = \$16\frac{2}{3}$ , and Bricket must pay the same sum,  $\$16\frac{2}{3}$ . For the last 3 months, each must pay  $\frac{1}{3}$  of  $\$33\frac{1}{3} = \$11\frac{1}{3}$ .  $\$33\frac{1}{3} + \$16\frac{2}{3} + \$11\frac{1}{3} = \$61\frac{1}{3}$ , Bailey's share of rent;  $\$16\frac{2}{3} + \$11\frac{1}{3} = \$27\frac{2}{3}$ , Bricket's share;  $\$11\frac{1}{3} = \$11\frac{1}{3}$ , Dana's share.
78.  $42\frac{1}{2} \times 12 \times 24 \times 3 = 36504$  cubic inches, it being the solid contents of the plank.  $3 \times 2 = 6$  inches, twice the thickness of the plank. We now subtract the cube of 6 from the contents of the plank;  $6 \times 6 \times 6 = 216$ ;  $36504 - 216 = 36288$ ; we next divide this remainder by 6, because there are 6 sides to a cube;  $36288 \div 6 = 6048$ . We now divide by 3, because the plank is 3 inches thick;  $6048 \div 3 = 2016$ . To this number we add  $\frac{1}{4}$  of the square of  $6 = 9$  to compensate for certain deficiencies occasioned by deducting 216 from the corners of the box;  $2016 + 9 = 2025$ . By extracting the square root of this number, we obtain the distance from the outside of the box to the opposite inside of it;  $\sqrt{2025} = 45$  inches. If to this number we add 3 inches, the thickness of the plank, we obtain the side of the cubical box;  $45 + 3 = 48$  inches, Ans.

NOTE. In the first edition of the Arithmetic, the width of the plank is 12 inches; but it should be 24 inches.

#### OPERATION BY ALGEBRA.

Let  $x$  represent the length of the outside of the box, and  $y$  the inside of it. Then

$$x - y = 6$$

$$\text{And } x^3 - y^3 = 36504.$$

$$x = y + 6.$$

By cubing both sides of this equation,

$$x^3 = y^3 + 18y^2 + 108y + 216.$$

Let this be substituted for  $x^3$  in the second equation. Then

$$y^3 + 18y^2 + 108y + 216 - y^3 = 36504.$$

And by reduction,

$$18y^2 + 108y = 36504 - 216 = 36288.$$

$$y^2 + 6y = 2016.$$

$$y^2 + 6y + 9 = 2016 + 9 = 2025.$$

$$y + 3 = 45.$$

$$y = 45 - 3 = 42 \text{ inches, inside of the box.}$$

$$\text{And } 45 + 3 = 48 \text{ inches, outside of the box, Ans.}$$

79. \$100 - \$10 = \$90; \$100 + \$16 = \$116; \$116 - \$90 = \$26; \$26 : \$100 :: \$21.84 : \$84.00, real value of the horse; \$100 : \$90 :: \$84.00 : \$75.60, price paid, Ans.

80. \$100 - \$12 = \$88; \$88 : \$100 :: \$4.40 : \$5.00; \$100 : \$110 :: \$5.00 : \$5.50, Ans.

(81.)

|                      |                         |               |
|----------------------|-------------------------|---------------|
| Emily, Jane,         | Abigail, Nancy,         | \$ 19,000     |
| Emily, Jane, Betsey, | Abigail,                | 19,200        |
| Jane, Betsey,        | Abigail, Nancy,         | 20,000        |
| Emily,               | Betsey, Abigail, Nancy, | 20,500        |
| Emily, Jane, Betsey, | Nancy,                  | 21,300        |
|                      |                         | 4) \$ 100,000 |

Sum of the fortunes, \$ 25,000

$$\$ 25,000 - \$ 19,000 = \$ 6,000, \text{ Betsey's fortune.}$$

$$\$ 25,000 - \$ 19,200 = \$ 5,800, \text{ Nancy's fortune.}$$

$$\$ 25,000 - \$ 20,000 = \$ 5,000, \text{ Emily's fortune.}$$

$$\$ 25,000 - \$ 20,500 = \$ 4,500, \text{ Jane's fortune.}$$

$$\$ 25,000 - \$ 21,300 = \$ 3,700, \text{ Abigail's fortune.}$$

# POPULAR SERIES OF ARITHMETICS,

ADAPTED TO ALL GRADES OF PUPILS;

IN THREE BOOKS.

BY BENJAMIN GREENLEAF, A. M.

PRINCIPAL OF BRADFORD (MASS.) TEACHERS' SEMINARY.

IMPROVED STEREOTYPE EDITIONS.

THE publisher invites the attention of Teachers and School Committees to this valuable series of Arithmetics, and especially to the important improvements which have recently been made.

## I. MENTAL ARITHMETIC.

This book, as its title indicates, is strictly *mental*, and designed for children; and while it is sufficiently simple and easy for "beginners," it advances with gradual steps till it presents to the learner all the Tables in simple and compound numbers, and many ingenious and practical questions under them, and also several sections in simple fractions, the whole being admirably adapted to the capacities of young scholars, and to prepare them for the next book of the series.

## II. INTRODUCTION TO THE NATIONAL ARITHMETIC.

This book consists of mental and written Arithmetic, "on the **INDUCTIVE SYSTEM**, combining the **ANALYTIC AND SYNTHETIC METHODS**."

The present edition has been thoroughly revised and entirely rewritten, and nearly 150 pages of new matter have been added. The following are some of the prominent features of this work.

1. The arrangement is strictly progressive and philosophical, no principle being *anticipated*.

2. The language is simple, precise, and accurate, rendering the rules, definitions, and illustrations, intelligible to the pupil.

3. The examples are eminently *practical*, and adapted not only to illustrate and fix in the mind the principles which they involve, but also to interest the pupil, exercise his ingenuity, and inspire a love for the science.

4. The *reasons* for the operations have been shown, and the learner is led to look into the philosophy of the subject, rather than perform mechanically operations which he does not understand.

The subject of Cancellation is more fully treated, it is believed,

than in any other work of the kind. The principles upon which it depends, and the different modes of operation are fully developed, and its application and use are made perfectly clear to the scholar.

6. Several subjects not in the former edition, have been added in this; as, Ratio, Duties, Profit and Loss, Factors, Progression, Annuities, &c.; and others, as, Notation and Numeration, Interest, Proportion, Extraction of the Roots, and their application, have been greatly extended and improved, *making the book sufficiently extensive for Common Schools.*

7. Questions have been inserted at the bottom of the pages, designed to direct the attention of teachers and pupils to the most important principles of the science, and fix them in the mind.

### III. THE NATIONAL ARITHMETIC.

This book is designed more particularly for advanced scholars in our Public Schools, High Schools, and Academies, and, like the INTRODUCTION, combines the ANALYTIC AND SYNTHETIC METHODS. It was revised in 1847, and contains the most valuable modern improvements.

In describing its prominent characteristics it may be remarked,—

1. That it is a complete system of itself, comprising all the elementary Rules, as well as those pertaining to the higher branches of the science, together with a full illustration and demonstration of their principles, and contains, it is believed, a greater amount and variety of matter strictly arithmetical, than can be found in any other treatise of the kind.

2. It embraces a large amount of mercantile information not usually found in arithmetics, but important to those destined for the warehouse or counting room.

3. The Custom House business, carefully prepared by officers of the Boston Custom House, the Philosophical and Geometrical Problems, the articles on Banking and Exchange, are full, and have passed under the revision of those who are well acquainted with these respective departments.

Of the entire Series of Arithmetics thus briefly described, we have ample testimony from many of the most intelligent School Committees and Teachers in New England and elsewhere, *that it is better adapted than any other before the public, to secure to the pupil MENTAL DISCIPLINE, thorough knowledge of the principles of the science, and facility in their application.*

The great popularity of Greenleaf's Arithmetic is indicated by the fact that it is now in general use in the best schools throughout New England, including the several STATE NORMAL SCHOOLS, in Massachusetts, in New York City, and in hundreds of academies and select schools in various sections of the United States.

Two editions of this Arithmetic, one containing the *answers* in the book, and the other without them, are now published.

COMPLETE KEYS to the INTRODUCTION and NATIONAL ARITHMETICS, containing full solutions and explanations, are prepared for the *convenience of teachers only.*

Copies of the work will be furnished for examination, on application to the Publisher, ROBERT S. DAVIS, No. 120 Washington Street, BOSTON, or to SANBORN & CARTER, Exchange Street, PORTLAND.

## RECOMMENDATIONS OF GREENLEAF'S ARITHMETIC.

GREENLEAF'S NATIONAL ARITHMETIC is now used as a text-book in the following important seminaries of learning, among others, which fact may be considered a high recommendation for the work.

The several STATE NORMAL SCHOOLS in Massachusetts, under the direction of the State Board of Education.

The *Normal Schools* in New York City; Rutgers Female Institute, New York; Brooklyn (N. Y.) Female Academy; Abbott Female Academy, and Phillips Academy, Andover; Chauncey Hall School, Boston; Bradford Female Seminary, (Mass.) Miss Hasseltine, Principal; Phillips Academy, Exeter; the Young Ladies' Institute, Pittsfield; Williams Academy, Stockbridge; Worcester County High School, Worcester; Catholic College, Worcester; Wesleyan Academy, Wilbraham; Amherst Academy; Quaboag Seminary, Warren; Framingham Academy; Hingham Academy; Portland Academy; Peirce Academy, Middleborough; Partridge Academy, Duxbury; Lowell Academy; Bristol Academy, Taunton; New Bedford Academy; Rev. D. Leach's Select School, Roxbury; Putnam High School, Newburyport; Friends' Academy, Providence; Kimball Union Academy, Meriden, (N. H.); Pembroke Academy; New Hampton Academy; Keene Academy; Hillsboro' Academy; Mount Cesar Seminary; Belfast Academy; Thetford Academy; Caledonia County Grammar School; the High Schools or Academies in Woodstock, Middlebury, Rutland, Montpelier, Burlington, Bradford, and many other towns in Vt.; the High Schools in Hallowell, Augusta, Waterville and Bangor, and many other distinguished institutions in various parts of the United States; and wherever the work has been introduced, it is still used with great success, — which is deemed a sufficient recommendation.

The whole or a part of this series, has been recommended and adopted by the superintending school committees of the principal towns throughout New England, including Andover, Haverhill, Newburyport, Salem, Beverly, Lynn, Portsmouth, Worcester, Springfield, Northampton, Pittsfield, Taunton, Fall River, Pawtucket, Bristol, Marblehead, Duxbury, Kingston, Plymouth, Weymouth, Hingham, Milton, Barnstable, Ipswich, Danvers, Brookline, Newton, Watertown, Medford, Quincy, Dedham, Nashua, Manchester, Concord, Fitzwilliam, Keene, Portland, Bangor, Belfast, Hallowell, Augusta, Waterville, Hartford, Norwich, and in the best public and private schools in various sections of the United States.

GREENLEAF'S ARITHMETICS are used in most of the Select Schools and Academies (including the following) in New York City, which are of the first grade.

|                                                              |                                   |
|--------------------------------------------------------------|-----------------------------------|
| <i>Washington Institute</i> ,.....                           | T. D. & T. W. Porter, Principals. |
| <i>Rutger's Female Institute</i> ,.....                      | Charles E. West, Principal.       |
| <i>Cornelius Institute</i> ,.....                            | Rev. J. J. Owen,                  |
| <i>All Saints' Parochial School</i> ,.....                   | Wm. A. Taylor,                    |
| <i>Commercial and Collegiate School</i> ,.....               | Hubbs & Clarke,                   |
| <i>Classical, Mathematical, and Com'l Institution</i> ,..... | H. Peugnet,                       |
| <i>Classical and English School</i> ,.....                   | Isaac F. Bragg,                   |
| <i>Classical and English School</i> ,.....                   | Charles Lyon,                     |
| <i>New York Institute</i> ,.....                             | E. H. Jenny,                      |
| <i>Trinity School</i> ,.....                                 | William Morris,                   |
| <i>Boarding and Day School for Young Ladies</i> ,.....       | Madame Chegaray,                  |
| <i>Mechanics' Institute School</i> ,.....                    | Mr. Tracy,                        |
| <i>English and Classical School</i> ,.....                   | Aaron Rand,                       |
| <i>Classical, Mathematical, and English Academy</i> ,.....   | J. F. Worth,                      |
| <i>Select School for Boys</i> ,.....                         | J. J. Greenough,                  |
| <i>Classical, French, and English School</i> ,.....          | Taylor & Foignet,                 |
| <i>Scotch Presbyterian School</i> ,.....                     | Robert H. Browne,                 |
| <i>City Commercial School</i> ,.....                         | J. B. Quick,                      |
| <i>Academy for Young Gentlemen</i> ,.....                    | E. L. Avery,                      |
| <i>Commercial and Collegiate Institute</i> ,.....            | J. Fanning & H. Cady,             |
| <i>St. Luke's School</i> ,.....                              | George A. Rogers,                 |
| <i>Female Academy</i> ,.....                                 | Mrs. Page,                        |
| <i>Classical and English School</i> ,.....                   | James Lawson,                     |
| <i>Brooklyn Female Academy</i> ,.....                        | A. Crittenden,                    |
| <i>Select School for Young Ladies</i> , (Brooklyn),.....     | A. Greenleaf,                     |
| <i>Collegiate and Commercial School</i> , (Brooklyn),.....   | James G. Russell,                 |
| <i>Brooklyn Grammar School</i> ,.....                        | Walter Chisholm,                  |

This system of Arithmetic is also the text book in the "Normal Schools," (male and female,) under the supervision of the Public School Society, and in the Schools in the City of New York, and in various parts of the State.













